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C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

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SPECIAL FEATURE IN THIS ISSUE

A Selective Annotated Bibliography on Icing

(For complete table of contents see back cover)

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FOREWORD

Each issue of Meteorological Abstracts and Bibliography consists of four parts, as ca be seen in the table of contents on the back cover.

Part I comprises 100 to 200 classified and annotated references to current material in th field of *Meteorology* and other fields immediately applicable to *Meteorology*.

In addition, the first issue (Vol. 1, No. 1) contained a **Review of 30 Current Meteorologica Periodicals,** and the second issue a **Review of 15 Meteorological Periodicals which have lapse**

Part II of each issue provides a means of accumulating the important references on give subjects without respect to recency. It is impossible to make these bibliographies exhaustiv under present personnel, time and printing limitations; but every attempt is made to include representative cross section of the various aspects of each subject, some preference being give to recent material, comprehensive works, those from obscure sources and those with goo bibliographies.

Selective, annotated bibliographies consisting of from 50 to 300 items each, have bee printed in the issues of Meteorological Abstracts and Bibliography, as follows:

(1) **Atmospheric Pollution,** Vol. 1, No. 1, Jan. 1950
(2) **Aerobiology**, Vol. 1, No. 2, Feb. 1950
(3) **Cloud Physics and "Rain Making,"** Vol. 1, No. 3, March 1950
(4) **Hail,** Vol. 1, No. 4, April 1950
(5) **Tornadoes,** Vol. 1, No. 5, May 1950
(6) **Volcanic Dust,** Vol. 1, No. 6, June 1950
(7) **Climatic Changes,** Vol. 1, No. 7, July 1950
(8) **Thunderstorms,** Vol. 1, No. 8, August 1950
(9) **Icing,** Vol. 1, No. 9, September 1950

Future issues will contain:

(10) **Acoustical Propagation,** Vol. 1, No. 10, October 1950
(11) **Evaporation,** Vol. 1, No. 11, November 1950

In Part III the contents of those journals which are primarily meteorological are liste and published in the earliest issue where space permits. These entries are not classified o indexed.

Part IV consists of author, subject and geographical indexes. The subject and geo graphical indexes are made up, as a rule, from the subject headings which follow each entr

In the June and December issues *cumulative* author and subject indexes will be publishe

LIST OF PERIODICALS

Note: In this list the preferred form of title for entry is given in bold face type. If the title is distinctive, the name and headquarters of the issuing society or organization follows the title. If the title is not distinctive the issuing organization precedes and is part of the title.

PERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

Akademiia Nauk, SSSR, Izvestiia, Ser. Geogr. i Geofiz., [Moscow].
American Geophysical Union, Transactions, National Research Council, Washington.
★**American Meteorological Society, Bulletin,** [Boston].
★**Annalen der Meteorologie,** Meteorologisches Amt für Nordwestdeutschland, Hamburg.
Annali di Geofisica, Istituto Nazionale di Geofisica, [Rome].
Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B, [Vienna].
Ciel et Terre, Société Belge d'Astronomie, de Météorologie et de Physique du Globe. Uccle-Bruxelles.
Geofisica Pura e Applicata, Istituto Geofisica Italiano, [Milan].
Geophysical Magazine, [Central Meteorological Observatory, Toyko].
Hemel en Dampkring, Nederlandse Vereniging voor Weer- en Sterrenkunde, [The Hague].
★**Időjárás,** Az Országos Meteorológiai és Földmágnességi Intézet, [Budapest].
★**Indian Journal of Meteorology and Geophysics,** [Delhi].
Journal of Geophysical Research (formerly Terrestrial Magnetism and Atmospheric Electricity), [Washington].
★**Journal of Meteorology,** American Meteorological Society, [Boston].
★**Journal Scientifique de la Météorologie,** Société Météorologique de France, [Paris].
★**The Marine Observer,** Air Ministry, Meteorological Office, London.
★**The Meteorological Magazine,** Air Ministry, Meteorological Office, London.
★**Meteorological Society of Japan, Journal,** Second Series, Kisho Shushi, [Tokyo].
★**Meteorologické Zprávy,** Státní Meteorologický ústav v Praze, [Prague].
★**La Météorologie,** Société Météorologique de France, [Paris].
★**Meteorologische Rundschau,** Bad-Kissingen, [U. S. Zone, Germany].
★**Monthly Weather Review,** U. S. Weather Bureau, Washington, D. C.
★**Nimbus,** Sociedad Meteorológica de Bolivia, [La Paz].
Polarforschung, Archiv für Polarforschung in Kiel, [Kiel, British Zone, Germany].
★**Revista Meteorológica,** Junta Nacional de Meteorología, Montevideo.
★**Rivista di Meteorologia Aeronautica,** Associazione Culturale Aeronautica, [Rome].
★**Royal Meteorological Society, Quarterly Journal,** [London].
★**Tellus,** Svenska Geofysiska Föreningen, Stockholm.
Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Moscow-Leningrad].
★**Weather,** Royal Meteorological Society, [London].
★**Weather Development and Research Bulletin,** Australia, Meteorological Branch, [Melbourne].
★**Weatherwise,** Amateur Weathermen of America, Philadelphia.
★**Wetter und Klima,** Deutscher Meteorologischer Dienst im Französischen Besatzungsgebiet, Seelbach b. Lahr/Baden, [French Zone, Germany].
★**Wetter und Leben,** Österreichische Gesellschaft für Meteorologie, [Vienna].
★**Zeitschrift für Meteorologie,** Meteorologisches Observatorium, Potsdam, [U. S. S. R. Zone, Germany].

★ Indicates those periodicals which are primarily meteorological.

EXPLANATIONS

Location of material: While it is physically impossible to give for each entry the name of ever library where that item might be obtained, it is possible, by using standard library symbols, to gi the reader some idea of where he might obtain such material. So in most instances a symbol take from the Union List of Serials (Gregory), or the Union Catalogue of the Library of Congress will l given just before the text of each abstract. In some cases where no symbol has been assigned a library, one will be invented by using the general principle of the Union Catalogue list. As a ru the library indicated will be in the District of Columbia, with an occasional reference to one in Ne York or Boston. It will be noted that D stands for District of Columbia, M for Massachusetts ar N for New York. Thus **DWB** stands for the U. S. Weather Bureau Library in Washington, D. C and **MH–BH** for the Blue Hill branch of the Harvard Library in Boston, Mass. In the latter cas since the Blue Hill Observatory contains not only the Harvard Observatory Library but that of t American Meteorological Society, the same symbol (**MH–BH**) will stand for either or both librarie

Library symbols: The following abbreviations have been used for Libraries in which the specif material thus indicated in this issue is located:

DA:	U. S. Department of Agriculture Library, Washington, D. C.
DAMS:	Material in hands of American Meteorological Society Abstracts, P.O. Box 173 Washington 13, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
MH:	Harvard University Library, Cambribge, Mass.
MH–BH:	Harvard University, Blue Hill Observatory (and American Meteorological Society) Library, Milton, Mass.

Geographical (place) names are in the form generally used internationally, rather than in the form used locally. For instance Vienna is used instead of Wien, Florence for Firenza, Moscow for Moskva and Germany for Deutschland, etc.

Titles of articles or monographs are in the language of the original article unless otherwise state Slavic (Cyrillic) titles are transliterated according to the Library of Congress transliteration schem into the Roman Alphabet.

Entries for **titles of periodicals** are given in the form used on the title page of the periodical providin the title is distinctive (Monthly Weather Review, Meteorologické Zprávy, and Revista Meteo ológica). If the journal is the official organ of a society or institution and the title is not distinctiv as is the case with Transactions, Bulletins, Proceedings, Comptes Rendus, Trudy, Izvestiia, Sitzung berichte, Verhandelingen, Miscellanées, etc., the preferred name of the organization is given firs as part of the title (American Geophysical Union, Transactions; Royal Society of London, Pr ceedings).

Abbreviations and other symbols:

Titles of periodicals are not abbreviated as a rule. Other abbreviations will be used sparingl and only when the abbreviation is obvious.

The months of the year from March through July are not abbreviated. Other months ar abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec., respectively.

The word or abbreviation for Volume, (Tom, Band, Jahrgang, Año, etc.) and for Numbe (Heft, Fascicule, Vypusk) and page or pages is omitted from most entries. Thus an entry will rea as follows:

Meteorologische Rundschau 2(5/6):146–151, May/June 1949.

This indicates that the article was in the Meteorologische Rundschau, Jahrgang 2 (Vol. 2) Heft 5/6 (No. 5 and 6), pages 146–151, Mai/Juni 1949.

The symbol * before an entry indicates a good data source.

The symbol † before an entry indicates a good bibliography source.

The symbol § indicates a synoptic case history study accompanied by charts.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

GENERAL METEOROLOGY

9–1 551.5(08)

†Mügge, Ratje, (Sr. author), **Meteorology and physics of the atmosphere.** Wiesbaden, Office of Military Government for Germany, FIAT, 1948. 291 p. figs., tables, numerous refs., equations. (*FIAT Review of German Science* 1939–1946.) In German, English contents. **DLC**—A number of well-known German meteorologists present a systematic review of literature and research done by German scientists between 1939 and 1946 in several important fields. Each chapter contains numerous references to published works in the respective field:

Climatology	K. Knoch, H. Flohn and others
Radiation	F. Möller and R. Meyer
Cloud Physics	F. Möller
Dynamics of the Atmosphere	H. Lettau
Weather Forecasting	R. Scherhag, R. Seilkopf, H. Flohn
Upper Atmosphere	R. Penndorf, D. Stranz
Instruments	H. G. Müller
Atmospheric Chemistry	H. Cauer

The chapter on **Dynamics of the Atmosphere** is especially comprehensive, particularly on the subject of turbulence and energy exchange. *Subject Headings:* **General meteorology, Meteorological progress, Germany.**—*M.R.*

9–2 551.5(04)

Ashford, O. M., **Sick leave.** *Weather,* 5(6):217–219, June **1950.** 2 sketches. **DWB**—Popular article on analogy between weather forecasting and medicine. *Subject Heading:* **General meteorology.**

9–3 551.5:06

Germany. Deutscher Wetterdienst in der U. S. Zone, **Die Vorträge anlässlich der 1 Tagung der meteorologischen Gesellschaft, Bad-Kissingen vom 1 bis 3 Oktober 1949 in Bad Kissingen.** [Proceedings of the first meeting of the Meteorological Society of Bad Kissingen October 1–3, 1949.] *Berichte,* No. 12, Bad Kissingen, **1950.** 271 p. **MH-BH**—Opening speech by L. Weickmann. Sixty four papers, indexed separately. *Subject Headings:* **Meteorological societies, Symposia.**—*C.E.P.B.*

9–4 551.5:06

Royal Meteorological Society, **Symposia held at Oxford, March 1950. Further reports.** *Meteorological Magazine, London,* 79(937):201–203, July **1950.** 3 refs. **MH-BH**—Summaries of discussions on: Radiation and its effect on the troposphere and lower stratosphere; The structure of weather systems; Meteorology and the community. *Subject Headings:* **Royal Meteorological Society, Symposia.**

9–5 551.5:061.4

Frankcom, C. E. N., **Centenary of the Royal Meteorological Society.** *Marine Observer,* 20(149):170–174, July **1950.** 2 photos. **MH-BH**—Photos illustrate parts of exhibition: passage of a depression across British Isles and collection of weather observations from ships. *Subject Headings:* **Royal Meteorological Society, Meteorological exhibitions.**

9–6 551.5:

Wittich, Inge, **Die Meteorologie im Mittelschulunterricht.** [Meteorology in seconda education.] *Deutscher Wetterdienst in der U. S. Zone, Berichte,* No. 12, p. 28–30, Bad K singen, **1950. MH-BH**—In Austrian schools teaching of meteorology is planned as part physics (general principles) and geography (local and general climate). Difficulties discusse *Subject Heading:* **Teaching of meteorology.**—*C.E.P.B.*

9–7 551.5:

Schneider-Carius, Karl, **Goethe und die Meteorologie.** [Goethe and meteorology *Deutscher Wetterdienst in der U. S. Zone, Berichte,* No. 12, p. 5–12, Bad Kissingen, **1950.** refs. **MH-BH**—Account of Goethe as observer of weather phenomena and weather prophe *Subject Headings:* **General meteorology, Biography, Goethe.**—*C.E.P.B.*

9–8 551.5:517.512

Pogade, Georg, **Meteorologische Perioden und Perioden aus Zufallszahlen.** [Meteor logical periodicities and periodicities in random numbers.] *Deutscher Wetterdienst in d U. S. Zone, Berichte,* No. 12, p. 232–240, Bad Kissingen, **1950.** 8 figs., 27 refs. **MH-BH** Defant and Preusche found periodicities of 6, 9, 13 and 24 days in daily rainfalls. By applyi their method of analysis to random numbers author found the same "periodicities." Similar singularities are found in random numbers. *Subject Headings:* **Periodicities, Fourier series.** *C.E.P.B.*

9–9 551.5:681.1

†Guss, H. and Reichel, E., **Anwendungen des Lochkartenverfahrens in der Meteorologi** [Applications of punched card technique to meteorology.] *Deutscher Wetterdienst in d U. S. Zone, Berichte,* No. 12, p. 141–151, Bad Kissingen, **1950.** 3 figs., 2 tables, biblio. of 4 items. **MH-BH**—Earlier applications to meteorology are summarized. The importance frequency investigations and the many-sided possibilities of punch cards are emphasize These include also periodograms and especially synoptic climatology, a study of great impor ance. Examples given. Cost and time of punching cards a difficulty. Recent technic advantages mentioned. *Subject Headings:* **Punched card application, General meteorology.** *C.E.P.B.*

9–10 551.5:016(0

†Schlegel, Max, **Wiegendrucke meteorologischen Inhalts aus der Wetterdienstbibliothe** [Early printed editions with meteorological contents in the Library of the Weather Service *Deutscher Wetterdienst in der U. S. Zone, Berichte,* No. 12, p. 20, Bad Kissingen, **1950.** 8 ref to books 1482–1493. **Die Entwicklung des meteorologischen Lehrbuches seit 1500 an Be spielen aus der Wetterdienstbibliothek.** [The development of the meteorological textboo since 1500 with examples from the Library of the Weather Service.] *Ibid.,* p. 21–23. 91 ref to books 1504–1948. **MH-BH**—*Subject Headings:* **General meteorology, Bibliographies.**

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

OBSERVATIONS

9–11 551.501 551.508:629.1

Perreault, William D., **Improved weather service promised by WB-CAA tests.** *America Aviation,* 13(7):33–35, Sept. 1, **1949.** photo. **DLC**—Mention of "end of runway" observa tions during bad weather, improved ceiling and visibility measuring procedures and cooperati airway reporting stations which are being tried out at Washington National Airport, Idlewil Airport and in Pennsylvania, respectively, by the U. S. Weather Bureau for greater accuracy airways reporting. *Subject Headings:* **Airways observations, Aviation climatology.**—*M.R.*

9–12 551.501.1:656.6(02

Tannehill, Ivan R., **Circular R—Preparation and use of weather maps at sea.** 3rd ed Washington, D. C., U. S. Weather Bureau, **1949.** 117 p. 64 figs., fold. map, 2 tables, appen

with 37 code tables. **DWB**—This new edition of Circular R includes all of the necessary tables and specifications of the Toronto code (effective Jan. 1, 1949), and in addition to instructions for plotting and analyzing simple weather charts, a great deal of information and illustrations on air masses, fronts, disturbances, tropical cyclones, the general circulation, centers of action, wind systems, squalls, fog, etc. The section on observing and predicting hurricane movements by winds, swells, clouds, etc., is quite complete. *Subject Headings:* **Marine meteorology, Instruction for observers, Manuals.**—*M.R.*

9–13 551.501.1:551.576.1(02)

U. S. Weather Bureau, **Circular S—Manual of cloud forms and codes for states of the sky.** 2nd ed. Washington, D. C., U. S. Government Printing Office, **1949.** 43 p. 47 cloud photos, codes. **DWB**—Definitions of cloud forms to agree with the decisions of the I.M.O. conference of directors (Washington, 1947). Excellent cloud photos illustrate the various code forms prescribed. Supersedes the first edition (1938) effective Jan. 1, 1949. *Subject Headings:* **Instruction for observers, Cloud atlases, Manuals.**—*M.R.*

9–14 551.501.6:551.515

Kleinschmidt, E., **Über den Aufbau atmosphärischer Druckgebilde.** [On the construction of atmospheric pressure diagrams.] *Deutscher Wetterdienst in der U. S. Zone, Berichte,* No. 12, p. 36–40, Bad Kissingen, **1950.** 3 figs., 2 refs., equations. **MH-BH**—Illustrates construction of (a) cross sections of vertical variation of potential temperature; (b) curves of temperature and $\Delta p/p$; (c) Ertel's "rotation invariant," all against height for (1) warm anticyclone with high tropopause; (2) elevated lens of high potential temperature (16.3.43); (3) young frontal cyclone. *Subject Headings:* **Aerological diagrams, Atmospheric disturbances.**—*C.E.P.B.*

9–15 551.501.6:551.521

Sönnquist, Olov, **A general method and a simplified formula for calculating effective radiation.** *Arkiv för Geofysik, Stockholm,* 1(4), **1950.** 115 p. 7 figs., 20 tables, refs. **DLC**—Use of actual upper air temperature and humidity data to improve the radiation formulas of Ångström and Brunt (as was done by Elsasser, Mügge and Möller), is considered essential to accurate estimates of outgoing radiation and consequent forecasts of minimum temperatures, thickness of stratus, etc. The author reviews the whole subject of downward and outward radiation in isothermal and non-isothermal atmospheres, and clear and cloudy skies. No general agreement has ever been reached as to values of effective (long-wave) radiation, absorption by CO_2, or even by water vapor. Using Albrecht's coefficients of absorption, dividing the long wave into 9 bands, and the atmosphere into 5 layers, a simplified formula has been devised to improve Elsasser's charts for use in forecasting. Stresses need for radiation measurements at same time as aerological soundings. *Subject Headings:* **Nomograms, Radiation measurements.**—*M.R.*

9–16 551.501.7:551.509.2:551.511

Fedele, Diego, **Gli emagrammi e le loro caratteristiche geometriche in relazione agli usuali calcoli aerologici.** [Emagrams and their geometric characteristics in relation to ordinary aerological calculations.] *Rivista di Meteorologia Aeronautica,* 9(2):27–37, April–June **1949.** figs., 5 refs., 11 equations. **MH-BH**—Various types of charts for use in upper air calculations, based on networks of curves of isobars and isotherms, are discussed theoretically and their use illustrated. The Refsdal emagram and the Werenskiold diagram are recommended for use in rapid working up of aerological soundings, and the Shaw tephigram, or a modification thereof which is illustrated, and the Refsdal aerogram are suggested for synoptic analysis or aviation forecasting. The Clapeyron diagram is described for calculation of solenoidal fields. *Subject Headings:* **Aerological diagrams, Emagrams.**—*M.R.*

9–17 551.501.81:551.594.25

Hooper, J. E. N. and Kippax, A. A., **Radar echoes from meteorological precipitation.** *Institution of Electrical Engineers, Proceedings,* Pt. I, 97(105):89–95, May 1950. 5 figs., 6 tables, 7 refs., 10 equations. Discussion by Dr. R. A. Smith p. 95–97. **DLC**—A brief well-

illustrated article reviewing recent investigations of the theory, apparatus and application of radar techniques to detection of rain, snow and storms for research into the physics of storms, precipitation, etc. and for short range forecasting. Cause of bright band echo discussed. *Subject Headings:* **Radar storm detection, Bright band echoes.**—*M.R.*

9–18 551.501.81:551.515

Radar tracks hurricanes—Results promise aid in system operation. *Electrical World* 133(17):91–93, April 24, **1950.** 5 photos. **DLC**—Radar has been used since June 1948 by the Dow Chemical Co. for detecting hurricanes approaching its Freeport, Texas plant. The plant must start closing 12 hours before the hurricane strikes, so it will be shut down during the storm. Advance and accurate warnings save "false alarm" shutdowns which are costly. Three other such hurricane warning installations are mentioned: (1) the Humble Oil Co. (Louisiana), (2) Univ. of Florida and (3) U. S. Weather Bureau at Miami. All are operated by the Weather Bureau under direction of Harry Wexler. Radar not as useful in detecting storms inland. *Subject Headings:* **Radar storm detection, Hurricane warning service, Industrial meteorology, Texas.**—*M.R.*

9–19 551.506:06(9

Holzapfel, Rupert, **Die Tätigkeit des deutschen Wetterdienstes der Luftwaffe in der Arktis während des Krieges.** [The activity of the German Air Force Weather Service in the Arctic during the war.] *Deutscher Wetterdienst in der U. S. Zone, Berichte,* No. 12, p. 129–13 Bad Kissingen, **1950.** chart, ref. **MH-BH**—Regular weather flights from north Norway, weather ship off Greenland; land stations (including Spitsbergen); automatic stations; training station in Norwegian mountains discussed. *Subject Headings:* **Meteorological service, Arctic.**—*C.E.P.B.*

9–20 551.506.5(98

van der Bijl, W., **Midden op de Groenlandse ijsvlakte.** [In the middle of Greenland ice cap.] *Hemel en Dampkring,* 48(5):92–94, May **1950.** fig. Note, *ibid.* 48(3):54, March **1950. DLC**—A French expedition, under Paul-Émile Victor, has been occupying the station "Eismitte" on Greenland (70°54′N., 40°42′W., 3000 m. elevation) since July 1949. Extreme temperatures found this past fall and winter are compared with those found there by Alfred Wegener in 1930–31, and those in Siberia. Lower extreme temperatures (−55°C.) occurred in the autumn at the icecap station than in the free air at the same elevation, owing to radiation properties of snow and ice. A profile of Greenland at 70° lat. shows 6 meteorological stations and topography of sea, mountains and ice. *Subject Headings:* **Expeditions, Temperature extremes, Eismitte, Greenland.**—*M.R.*

9–21 551.507

Frankcom, C. E. N. and Ford, A. W., **Ocean Weather Station "Jig"; a joint Anglo-Netherlands venture.** *Marine Observer,* 20(149):176–179, July **1950.** 2 photos. **MH-BH**—Description of Ocean Weather Ship "Cumulus." *Subject Heading:* **Weather ships.**

9–22 551.507.2:629.1

Schregardus, M. W. F., **Het weerschip Aer Mas.** [The weather ship "Aer Mas."] *Chronica Naturae, Batavia,* 105(10):249–252, Oct. **1949.** 3 figs. **DLC**—An illustrated description of the Dutch weather ship located in the Indian Ocean; its observational program, map analysis, aid to aviation and other functions. *Subject Headings:* **Weather ships, Aviation meteorology.**—*M.R.*

9–23 551.507

Wernas, A. W., **Leven en werken aan boord van de Aer Mas, het weerschip in de Indische Oceaan.** [Life and work on board the "Aer Mas," the weather ship in the Indian Ocean] *Hemel en Dampkring,* 48(2):21–25, Feb. **1950.** photo. **DLC**—Description of ship, ocean weather station and incidents about life thereon during a 3 month tour of duty at sea. *Subject Heading:* **Weather ships.**—*M.R.*

9–24 551.507.2:551.506.5:551.46

Williams, C. H., **The Royal Research Ships** *Discovery II* **and** *William Scoresby*. *Marine Observer*, 20(149):168–169, July 1950. 2 photos. **MH-BH**—*Subject Headings:* **Oceanographic expeditions, Research ships.**

INSTRUMENTS

9–25 551.508.77

Gerdel, R. W., Hansen, B. Lyle, and Cassidy, W. C., **The use of radioisotopes for the measurement of the water equivalent of a snow pack.** *American Geophysical Union, Transactions*, 31(3):449–453, June 1950. 2 figs., table, 2 refs. **MH-BH**—The authors discuss the theoretical presuppositions and the design of a radiotelemetering gage that uses the principle of absorption by water (liquid or solid phase) of the gamma emissions from an artificial radioactive isotope. The apparatus employing Cobalt 60 as the source of gamma rays has been used to measure up to 55 water equivalent inches snow by counting the pulses from a suitably located Geiger-Müller tube. The pulses have been relayed by radio. The article contains a sketch of the field installation of the radioactive telemetering snow gage and a calibration curve for the apparatus. *Subject Heading:* **Snow gages.**—*I.L.D.*

9–26 551.508.77

Kopp, Walter, **Niederschlagsanalysen mit dem Tropfenschreiber.** [Rainfall measurements with the drop recorder.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 241–247, Bad Kissingen, 1950. 6 figs., 3 tables, 3 refs. **MH-BH**—A simple clock-driven rainfall recorder is described and some records reproduced. These are used to analyze the rainfall in showers, occlusion and warm front. *Subject Heading:* **Rain and snow recorders.**—*C.E.P.B.*

9–27 551.508.77

Mercanton, P.-L., **Les recherches de technique pluviométrique et la nouvelle carte des précipitations de la Station Centrale Suisse de Météorologie. (M.Z.A.)** [Research on rainfall technique and the new rainfall chart of the Swiss Central Meteorological Station. (M.Z.A.)] *La Météorologie*, Ser. 4, No. 15:173–178, July–Sept. 1949. 4 figs. Summaries in French and English p. 173. **MH-BH**—Brief summary of results of investigations carried out at Zurich and published in the *Annales* of that station for the years 1937, 1938, 1939, 1940 and 1944. Attempt has been made to devise an aerodynamically neutral rain gage, and automatic snow and rain gages for high mountain stations and to improve control of $CaCl_2$ solution in such gages. Comparisons were made between types of gages and exposures at mountain stations. An improved rainfall chart for Switzerland is described. *Subject Headings:* **Rain gages, Rainfall charts, Rain and snow recorders, Switzerland.**—*M.R.*

9–28 551.508.822

Beggs, George E., Jr., **Range-adjusting radiosonde recorder.** *Electrical Engineering*, 68(11):990, Nov. 1949. fig. **DLC**—Description, accompanied by wiring diagram of recorder, which automatically adjusts for drift in reference frequency. *Subject Heading:* **Radiosonde recorders.**—*M.R.*

9–29 551.508.822

Müller, Hans Gerhard, **Über die Beeinflussung aerologischer Thermometer durch Wolkengrenzen.** [The influence of cloud limits on radiosonde thermometers.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 248–252, Bad Kissingen, 1950. 2 figs., 6 refs. **MH-BH**—Comparison of results of radiosondes with observations at mountain stations shows that in cloudy weather the radiosonde temperature is often too low above a cloud surface, especially with American instruments. Consideration of relative humidity shows that the thermal element is acting as a wet-bulb. Possible remedies are discussed. *Subject Heading:* **Radiosonde errors.**—*C.E.P.B.*

9–30 551.508.822

Raab, Lars and Rodskjer, Niels, **A study of the accuracy of measurements of the Väisälä radiosonde.** *Arkiv för Geofysik, Stockholm*, 1(2):33–44, 1950. 2 figs., 7 tables, ref. **DLC**—

Sixteen tests made during 1946–47 at Uppsala, consisted of flights of single radiosondes with two barometers, and flights of two sondes at different distances from the balloon (to determine influence of balloon). The mean error was <0.3°C. up to the tropopause, but rapidly increased to 1.3°C. at 50 mb., indicating some balloon error. Results shown in equations, tables and graphs. *Subject Headings:* **Radiosonde errors, Väisälä radiosonde.**—*M.R.*

SYNOPTIC ANALYSIS AND FORECASTING

9–31 551.509(04)

Wood, C. A., **Synoptic holiday.** *Weather*, 5(7):235–240, July **1950.** 2 cloud photos. **DWB**—Popular article—western isles of Scotland. *Subject Headings:* **Weather forecasting, Scotland.**

9–32 551.509.3(6)

§Chancellor, Justus, III, **West African weather patterns; a study of outstanding meteorological conditions in tropical Africa.** Chicago, **1946** [i.e. 1947]. 150 leaves. 72 figs., 6 tables, 17 refs. **DLC**—A report based on wartime experience in aviation meteorology in various parts of Equatorial Africa. The main part of the work is concerned with the characteristics of the Intertropical Front, harmattan haze and thunderstorm rainfall. The large number of well-analyzed synoptic charts and cross sections for Equatorial West Africa, makes the work especially valuable for synoptic analysis and airways forecasting. *Subject Headings:* **Tropical meteorology, Synoptic analysis, West Africa.**—*M.R.*

9–33 551.509.3

Dzerdzeevskii, Boris L., **Kak predskazyvaiut pogodu.** [How to forecast weather.] Moscow, Gosudarstvennoe Izdatel'stvo Sel'skokhoziaĭstvennoĭ Literatury, **1949.** 79 p., 31 figs., 2 tables. **DLC**—This publication is one of the Nauchno-populiarnaia biblioteka (Popular-Science Library) bulletins for the enlightenment of nonscientists working in agricultural pursuits. The author is one of the foremost synoptic meteorologists of the USSR, having been assigned to the Papanin expedition to the North Pole in 1937–38 as synoptic analyst. In this book the general principles of observation, synoptic meteorology, physics of cloud, rain, snow and hail formation, weather analysis and short, medium and long range forecasting are discussed from a popular viewpoint, and illustrated by numerous schematic diagrams. Special attention is given to frost forecasting and protection, the use of shelter belts to conserve moisture, and snow retention. *Subject Headings:* **Elementary meteorology, Snow retention, Conservation, Weather forecasting.**—*M.R.*

9–34 551.509.3:551.55(484.9)

§Evjen, Sigurd, **Forecasting northwest gales in the Skager rack.** (*sic*) (**A synoptic statistical study.**) *Geofysiske Publikasjoner*, 17(5), **1949.** 18 p. 12 figs., tables. **MH-BH, DWB**—Twenty years of thrice daily synoptic charts were analyzed and classified in connection with a statistical study of 268 occurrences of NW gales in the Skagerrak. The duration and intensity of the gales were analyzed according to month, type of cyclone, mean direction of airflow (geostrophic wind), pressure gradient, barometric tendency, etc., and from this "synoptic climatology," a number of empirical rules for forecasting NW gales were formulated. Eight actual examples are discussed and illustrated by synoptic charts. *Subject Headings:* **Gale forecasting, Synoptic climatology, Skagerrak, North Sea.**—*M.R.*

9–35 551.509.3:551.515.4

Goualt, Jean, **Description de l'orage du 30 avril 1936 à Fort-Lamy.** [Description of the thunderstorm of April 30, 1936 at Fort-Lamy.] *Annales de Physique du Globe de la France d'outre-mer*, 4(20):33–35, April **1937.** 3 photos. **DLC**—An hour-by-hour account of meteorological conditions at Fort-Lamy (near Lake Chad) on a day when a violent and destructive thunderstorm hit that settlement. The storm moved in from the ENE, with winds estimated at 100 m.p.h. about 5 P.M. local time. The occurrence and even the intensity of the storm could have been forecast at 1300 T.M.G. if equipment (which was later installed) for registering

atmospheric parasites (now called *sferics*) had been operating. *Subject Headings:* **Thunderstorm forecasting, Fort-Lamy, French Equatorial Africa.**—*M.R.*

9–36 551.509.3

Jones, P. H., **I predict a storm; a critical analysis of New Zealand conditions, with an account of a new method of forecasting, and its application to world climatology.** Gore, N. Z., Gore Publishing Co., [1945]. 79 p. 48 figs., append. **DLC**—A number of provocative popular articles on weather forecasting, stressing the faults of the professional forecaster, and the successes of the amateur who is equipped with only a barometer, hygrometer and one of the author's hygrometric charts, plus a knowledge of local weather vagaries. The prediction diagram, which is really a correlation chart of temperature, moisture and weather (frost, rain, snow, etc.) has been used in New Zealand for 20 years, by amateurs and schools. Even air mass analysis and climatic classifications are explained and illustrated by these hygrometric charts. *Subject Headings:* **Amateur forecasting, Elementary meteorology, New Zealand.**—*M.R.*

9–37 551.509.3:629.13:551.58(931)

*§New Zealand. Meteorological Office, **Miscellaneous meteorological notes, Ser. A,** No. 1–10, (No. 9 missing), **1943.** figs., charts, tables. **DLC**—A series of restricted papers prepared during the war (now declassified) for the information and education of Air Force officers. Each paper is amply illustrated with schematic diagrams, synoptic charts and data. The separate articles are:

1. Gabites, J. F., **Weather analysis in the tropical South Pacific.**
2. Green, C. G., **Some characteristics of migratory anticyclones in the New Zealand area.**
3. Gabites, J. F., **Flying conditions in the tropical South Pacific.**
4. Barnett, M. A. F., **Note on sea surface temperature between New Zealand and Samoa.**
5. Seelye, C. J., **Notes on rainfall in the Pacific.**
6. Howell, E. H., **Note on a hurricane in the Fiji Group December 28th, 1942—January 2nd, 1943.**
7. Hutchings, J. W., **Orographical disturbances of the pressure field over New Zealand.**
8. Hutchings, J. W., **Orographical cyclogenesis over New Zealand.**
10. Seelye, C. J., **Notes on dew-point temperatures in New Zealand.**

Subject Headings: **Synoptic analysis, Rainfall, Hurricanes, Orographic effects, Cyclogenesis, Ocean temperatures, Aviation climatology, New Zealand.**—*M.R.*

9–38 551.509.3 551.509.5

Schumann, T. E. W., **The fundamentals of weather forecasting, Part I.** *Weather*, 5(6):220–224, June **1950.** 2 figs., 3 refs., 7 equations. **Part II, The principle of indeterminancy.** *Ibid.*, 5(7):248–253, July **1950.** fig., 6 refs. **DWB**—Part I, proposes a numerical test of accuracy of forecasts by correlation of observed and predicted departures. Discusses possible accuracy of forecasts by various methods, including statistical. Part II, the small uncertainties of quantum mechanics are magnified by secondary effects and limit possible accuracy of forecasts. In opposition to Sutcliffe, author thinks that ultimately a combination of mathematical and statistical forecasting will prove much superior to synoptic forecasting. *Subject Headings:* **Weather forecasting, Forecast verification.**

9–39 551.509.31 551.511

Vernič, Radovan, **Lokalna sinoptička analiza i termodinamičke karakteristike zračnih masa.** [Local synoptic analysis and thermodynamical characteristics of air masses.] *Rad Geofizičkog Zavoda u Zagrebu*, 2nd Ser., No. 2:19–88, **1948.** 22 figs., 9 tables, 60 refs., 19 equations. Summary in English p. 81–88. **MH-BH**—A detailed description, accompanied by elaborate contingency tables and charts, of the methods used in synoptic analysis and forecasting, at the Geophysical Institute in Zagreb. As reports from other countries were limited during the war, air mass and weather data for Yugoslavia were analyzed in detail by the Bergeron method of *synoptic climatology* and an air mass calendar constructed so that the general synoptic situation could be deduced from the local weather situation (especially the

conservative properties of air masses) and the local weather at other places then predicted by this same statistical method. *Subject Headings:* **Synoptic climatology, Synoptic analysis.**—*M.R.*

9–40 551.509.31

§Lumb, F. E., **Upper frontal analysis in the Mediterranean.** *Meteorological Magazine London*, 79(937):191–198, July **1950.** 5 figs. **MH-BH**—Cold fronts not shown on surface can be detected in 850 mb. level charts or in thickness lines 1000–700 mb. Charts given and analyzed for October 10, 1948 (front at 850 mb.) and August 18, 1948 (crowding of thickness lines). *Subject Headings:* **Synoptic analysis, Upper air data, Cold fronts.**

9–41 551.509.33 551.524.33:523.7

†Johnson, Maxwell Oscar, **Cycles in weather and solar activity.** Honolulu, Paradise of the Pacific Press, **1950.** 224 p. 37 figs., 13 tables, 74 refs. **DLC**—By using Alter's periodogram method, the author analyzes the long-term weather records for New Haven (160 years), Kualapuu, Hawaii (40 years) and England (rainfall records), and finds significant cycles of 11, 12, 13, 15, 17, 24, 31, 33, 38, 40, 42, 54, 56, 58, 59½, 66, 76, 90, 119, 147 and 272 months, and 14, 17, 19, 20, 22, 23, 26, 33, 36, 45, 52 and 175 years. The relation of solar activity and planetary movements to the weather is treated at length, and predictions based on a score of the above cycles are attempted. The conclusion is reached that accurate forecasts based on this incontrovertible evidence of weather control by planets and their influence on the sun must wait for more accurate measurements of solar radiation. An elaborate volume with data and graphs faithfully reproduced. *Subject Headings:* **Temperature periodicities, Cycles, Sunspots.**—*M.R.*

9–42 551.509.3

Jones, Inigo and Nowland, G. W., **Australian weather forecasts; 17 years 1944–1960** [Sydney], Long Range Weather Forecasting Trust, [**1944**]. 54 p. **DLC**—Actual forecasts of rainfall made by Inigo Jones for each year from 1944–1957 and for 1958–1960 for Queensland, New South Wales, Victoria, Tasmania, South Australia, Western Australia and the Northern Territory, based on the hypothesis of the cyclical repetition of weather which would result from the action of planetary magnetic fields in the sun. Independent analyses and forecasts for all of Australia for each year from 1945–1961, made by G. W. Nowland, are included. Comments on long term changes in rainfall are appended. *Subject Headings:* **Long range forecasting, Australia.**—*M.R.*

9–43 551.509.33:551.543.

Petitjean, L., **Prévision à longue échéance des anomalies de la pression barométrique et de la pluviométrie.** [Long range forecast of the anomalies of barometric pressure and rainfall.] *La Météorologie*, Ser. 4, No. 15:123–131, July–Sept. **1949.** 3 figs., map, ref. Summaries in French and English p. 123. **MH-BH**—Using mean monthly pressure charts for the period 1883–1911 (constructed by the Deutsche Seewarte, Hamburg), the author has calculated mean pressures and departures for 32 intersections in the Northern Hemisphere (Atlantic-European sector), and has constructed elaborate anomaly charts showing the crests and troughs of quasi-stationary pressure oscillations. The law of alternation of pressure train waves is promulgated and applications to long range forecasting of movements of centers of anomalies cited. Rainfall anomalies, as well as movements of air masses, are predicted by this method. *Subject Headings:* **Long range forecasting, Symmetry points, Pressure oscillations.**—*M.R.*

9–44 551.509.54:551.577.3

Bergeron, Tor, **Über den Mechanismus der ausgiebigen Niederschläge.** [On the mechanism of heavy rainfall.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 225–232, Bad Kissingen, **1950.** 8 figs., 3 refs. **MH-BH**—Points out necessity for forecasts of widespread heavy rain. Rainfall is classified and mechanism of each type discussed and illustrated by special examples mainly showing effect of local coastal topography in quasi-stable winds. For a really effective study a very close network of rainfall stations observing

at least twice daily is required. *Subject Headings:* **Rainfall forecasting, Excessive rainfall.**—*C.E.P.B.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

UPPER ATMOSPHERE—IONOSPHERE

9–45 551.510.53:551.507.362

McLarren, Robert, **What upper air means to missiles.** *Aviation Week*, 51(8):21–26, Aug. 22, **1949.** graphs, 18 refs. **DLC**—Discussion of problems encountered in design of rockets and other vehicles intended for the upper stratosphere. The statement is made that "From sea-level to 35,332 ft. is termed the troposphere. In this region the temperature has a constant gradient of 3.56617 deg. F. per 1000 ft. Also the temperature remains at −67°F. from 35,332 ft. (no inches!!) to 104,987 ft., rises to 170.6°F. at 164,042 ft. and remains at this value to 196,850 ft., drops to −27.4°F. at 255,905 ft. Remains at this value to 272,309 ft." and so on. *Subject Headings:* **Rocket development, Structure of stratosphere.**—*M.R.*

9–46 551.510.535

*Baral, S. S., Mitra, R. K., and others, **Characteristics of the ionosphere over Calcutta (August 1949).** *Journal of Scientific and Industrial Research, New Dehli*, 8(11):432–434, Nov. **1949.** 2 figs., table. **DLC**—Daily, and in some cases, hourly observations of sporadic E ionization (freq. and height) are given in tabular form, and mean hourly values of penetration frequencies of the E and E_s regions, and the penetration frequencies and height of F_2 layer shown graphically. This is a regular monthly feature of the *Journal of Scientific and Industrial Research* in connection with hourly forecasts of maximum usable frequencies for different distances (0–3000 km.) by reflection from the F region over Calcutta. *Subject Headings:* **Ionospheric layers, Calcutta.**—*M.R.*

9–47 551.510.535

Bartels, Julius, **Ebbe und Flut in der Ionosphäre.** [Ebb and flow in the ionosphere.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 30–34, Bad Kissingen, **1950.** 3 figs., 9 refs. **MH-BH**—Lunar semidiurnal tides of the isobaric surfaces reach amplitudes of many km. in the ionosphere, as shown by diagrams of diurnal change at Huancayo (Peru) 11–18h. and diurnal variation. Solar tides are less important but there is an appreciable difference between ion concentration at sunspot maximum and minimum. *Subject Headings:* **Ionospheric composition, Atmospheric tides.**—*C.E.P.B.*

9–48 551.510.535:621.396.11

†Huxley, L. G. H. and Ratcliffe, J. A., **A survey of ionospheric cross-modulation.** *Institution of Electrical Engineers, Proceedings*, Pt. 3, 96(43):433–440, Sept. **1949.** 3 figs., table, 24 refs., 17 equations. **DLC**—History, detailed theory and results of recent experiments on cross-modulation in ionospheric research. Theories of Bailey and Martyn revised. Magnitude of cross-modulation effect can be calculated for any pair of stations. Methods of observation described. *Subject Headings:* **Ionospheric layers, Radio transmission, Microwave transmission.** —*M.R.*

9–49 551.510.535:551.506.7:621.396.11

†Mitra, S. N., **A radio method of measuring winds in the ionosphere.** *Institution of Electrical Engineers, Proceedings*, Pt. 3, 96(43):441–446, Sept. **1949.** 10 figs., 14 refs., 8 equations. **DLC**—An important article describing apparatus, theory, methods of observation and comparing results with those of others. By using a 4 Mc pulse transmitter and 3 receivers about 100 m. apart, 82 determinations of winds in the ionosphere were made. Frequency of speeds ranging from 20 to 120 m/sec., shown on histograms. Greatest frequency at about 50 m/sec., and from the SE (shown in polar histogram as *toward* NW). Diurnal variation also shown graphically (evidence of semidiurnal period). As results indicate no winds of this magnitude in F-region, these observations are assigned to the sporadic E-region (70–115 km.)

Results agree with those obtained from luminous phenomena (meteors and luminous clouds) by other workers but not in agreement with theory. *Subject Headings:* **Ionosphere, Microwave transmission, Upper air winds.**—*M.R.*

MECHANICS AND THERMODYNAMICS

9–50 551.511:551.515.83

Bilinski, Stanko, **O kinematičkim uvjetima frontogeneze.** [On kinematic conditions of frontogenesis.] *Rad Geofizičkog Zavoda u Zagrebu*, 2 Ser., No. 2:5–16, **1948.** 25 equations. Summary in English p. 14–16. **MH-BH**—Analysis of Bergeron's theoretical solution of the problem of the role of symmetrical, three dimensional deformation fields in frontogenesis and frontolysis. *Subject Headings:* **Frontogenesis, Thermodynamics of the atmosphere.**—*M.R.*

9–51 551.511:532.5

†Eliassen, Arnt, **The quasi-static equations of motion with pressure as independent variable.** *Geofysiske Publikasjoner*, 17(3), **1949.** 43 p. 2 figs., 22 refs., numerous equations. **DWB**—The author takes up in logical order the various theoretical aspects of dynamic meteorology, showing that in almost every case *pressure* (or log pressure) can be used instead of *geodynamic height* as the independent variable when dealing with atmospheric motions. In the first chapter the hydrodynamic equations, the thermodynamic equations, vertical velocities and the prognostic use of quasi-static equations in the Cartesian coordinates are treated. In chap. II, pressure is substituted for height, and vorticity, geostrophic wind, boundary conditions, etc. are considered. In chap. III, the curvature of the earth, in chap. IV and V the perturbation equations and in chap. VI the theory of quasi-geostrophic motion as applied to waves in a baroclinic westerly current are developed. Finally, a method is developed for numerical weather prognosis based on the quasi-geostrophic approximation. *Subject Headings:* **Dynamics of the atmosphere, Fluid mechanics, Mathematical forecasting.**—*M.R.*

9–52 551.511:532

Frenkel Ĭakov Il'ich, **Kinetic theory of liquids.** Oxford, Clarendon Press, **1946.** 488 p. 55 figs., 4 tables, refs. (in footnotes), numerous equations. **DLC**—This text is a clearly written and easily understood English edition of the author's **Kineticheskaia teoriia zhidkosteĭ** (Izdat. Akademii Nauk, SSSR, 1945), and was written at the University of Kazan in 1942, during the height of the invasion, by the internationally famous Russian physicist. The emphasis is on the solid-liquid, rather than the liquid-gas state usually treated in books on dynamics of fluids. It is shown how solids (especially crystals) act as liquids, and liquids (at temperatures near the crystallization point) act as solids in many respects. Problems which are treated in detail, often by methods original with the author are: evaporation, saturation, diffusion, condensation, electric conductivity near the crystallization or fusion point, viscosity, dissociation, change of state, heat and wave motion in liquids, optical properties, surface tension, polarization, orientation and rotation, thermodynamic theories of equilibrium between supersaturated vapor and droplets, liquid and solid embryos in vapor near saturation and the role of colloidal particles in condensation. In addition, there is a great deal of molecular physics and physics of highly polymeric substances and thermodynamics of liquids in the stable state. Possible applications of this theoretical work to studies on the physics of clouds, snow, ice, evaporation and soil moisture are innumerable. The "hole" theory of Altar and Fürth, regarding the basic cause of thermal movements in fluids and liquid motion itself, is developed further by Frenkel. *Subject Headings:* **Molecular physics, Fluid mechanics.**—*M.R.*

9–53 551.511:551.515.11

James, R. W., **On the theory of large-scale vortex motion in the atmosphere.** *Royal Meteorological Society, Quarterly Journal*, 76(329):255–276, July **1950.** 3 figs., table, 6 refs., 35 equations. **MH-BH**—In a highly mathematical discussion author re-examines the symmetrical vortex theory of the cyclone, using as fundamental parameters the intensity (pressure defect at the center) and spread radius (distance from center to maximum gradient). General expressions are found for the mass defect, total potential energy and total kinetic energy of geostrophic winds; these are estimated for 17 intense mature cyclones. The ratio of mean

geostrophic kinetic energy to mean potential energy is found to be about 0.08. The pressure profile is roughly the same for all symmetrical lows. The kinetic energy of ageostrophic motion is also discussed. The treatment is then extended to elliptical vortices, troughs and wedges and a "front" is shown to be formally represented by a line distribution of circular vortices. Finally a theory of the mutual interaction of quasi-geostrophic vortices is put forward. *Subject Headings:* **Cyclones, Vorticity.**

9–54 551.511:532

Prandtl, Ludwig, **Führer durch die Strömungslehre.** [Guide to fluid motion.] 3rd ed. (5th ed. of original) Brunswick, Friedr. Vieweg und Sohn, **1949.** 407 p. 347 figs., numerous refs. (in footnotes), numerous equations, append., classified biblio. **MH-BH**—Although not essentially a text on meteorology, this fifth edition of Prandtl's original work on hydrodynamics, *Abriss der Strömungslehre*, contains so much theoretical material that is basic to all branches of meteorology, and much that is actually applied to the study of the atmosphere and its boundaries, that it is one of the treatises which *must* be included in any meteorological research library. Much of the material is the result of original theoretical or experimental research, and the numerous illustrations and equations are easily interpreted by any meteorologist, whether he reads German or not. Subjects treated in detail include: properties of fluids, boundary layers, propagation of waves, turbulence, convection, friction or drag, wind waves, capillary action, air pressure, barometry, the properties of air-water, solid-water and solid-air mixtures, turbulent heat exchange, convective cells, Coriolis force, general circulation of the earth and sea, trade winds, vortices, slope winds, motion of stable air masses, visibility, aerodynamic properties of wind mills or anemometers; in addition to the classic theories of hydrodynamics (equations of motion or continuity, Bernoulli's equations, vorticity, stationary motion, etc.) The 1949 edition contains many references and notes not found in the 1942 or 1944 editions, and in addition has made available the results of much research made during the war, both in Germany and abroad, on convection, turbulence and boundary layer phenomena. *Subject Headings:* **Fluid mechanics, Mechanics of the atmosphere, Turbulence.**—*M.R.*

GENERAL CIRCULATION

9–55 551.513:551.552

Jordan, Charles L., **North-south profiles of the average zonal wind component at the surface.** *Royal Meteorological Society, Quaterly Journal*, 76(329):343–344, July **1950.** 2 figs., 3 refs. **MH-BH**—Figures show mean zonal wind over oceans, 45°N.–45°S., and mean geostrophic wind, 10–70°N. and S. for January and July. *Subject Headings:* **Zonal circulation, Geostrophic winds.**

9–56 551.513:551.555.1

Riehl, Herbert and Yeh, Tu-cheng, **Some comments on the trade-wind cell.** *Royal Meteorological Society, Quarterly Journal*, 76(329):340–342, July **1950.** fig., 2 refs., 6 equations. **MH-BH**—Investigating mathematically the descent of air in trade wind regions, authors conclude that the trades continually import high absolute vorticity into low latitudes. This vorticity is removed by lateral divergence at the same rate, and the trades being steady, this involves divergence north of 10°N. lat. *Subject Headings:* **General circulation, Vorticity, Trade winds.**

9–57 551.513:551.583.1

Scherhag, Richard, **Betrachtungen zur allgemeinen Zirkulation. I Teil. Die Schwankungen der allgemeinen Zirkulation in den letzten Jahrzehnten.** [Remarks on the general circulation. Pt. I. The variations of the general circulation in the last decades.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 40–45, Bad Kissingen, **1950.** 5 figs., 3 tables, 6 refs. Summaries in German and English p. 40–41. **MH-BH**—World charts show change of mean pressure and mean temperature 1921–40. Pressure rose in high latitudes and fell in low latitudes. Zonal changes are shown by decades since 1886 and sunspot cycles since 1875. The strengthening of the general circulation which had extended from 1886–1930 ceased in 1931–40. Nevertheless temperature continued to rise over much of the world,

especially Europe and the U.S.A *Subject Headings:* **General circulation, Climatic variations.**—*C.E.P.B.*

9–59 551.513:525.3

Rudloff, W., **Polschwankungen, atmosphärische Zirkulation und Sonnentätigkeit in propädeutischer Betrachtung.** [Polar movements, atmospheric circulation and solar activity considered in significant relationship.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 78–83, Bad Kissingen, **1950.** 15 figs. **MH-BH**—Departure of rotational from geographic pole is very closely related to equatorial boundary of Atlantic NE trade and total pressure north of 20°N. From 1900–1920 increased accumulation of air in high latitudes caused increased rotational speed; since 1920 process has been reversed. The annual component of polar movement is shown in each year 1900–1933; paths are elliptical (ca. 280x120 cm.), corresponding with semiannual mass exchange of air between tropics and extratropical northern latitudes. Author suggests atmospheric rotational impulse of whole earth as indicator of strength of atmospheric circulation; he calculated it for 30°W–30°E, 40°–70°N daily in August 1949 and found good correlation with sunspot numbers. *Subject Headings:* **General circulation, Polar orbit.**—*C.E.P.B.*

9–60 551.513(04)

Van Mieghem, Jacques, **Progrès récents en aérologie synoptique.** [Recent progress in synoptic aerology.] *Ciel et Terre*, 66(1–2):12–22, Jan.–Feb. **1950.** 9 refs., equations. **DLC**—A lecture by Prof. Van Mieghem given at a conference of the Société Belge d'Astronomie de Météorologie et de Physique du Globe on Nov. 27, 1948, setting forth the fundamental discoveries (by Palmén and others) regarding the upper troposphere in the zone of the westerlies which have been made in the last few years, as a result of studies of the consistent series of analyzed upper air synoptic charts issued by the U. S. Air Weather Service (since Jan. 1945). The double tropopause in the vicinity of the *jet stream* is one of the major discoveries, and another is the structure of the atmosphere over the sub-Arctic which results from the denser net of Arctic sounding stations now in existence. Future advances and changes in concepts, as a result of this work, are predicted. *Subject Headings:* **Meteorological progress, Synoptic aerology, Addresses.**—*M.R.*

ATMOSPHERIC DISTURBANCES

9–61 551.515

Raethjen, P., **Über die gegenseitige Adaptation der Druck- und Stromfelder.** [On the opposing adaptation of pressure and flow fields.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 2(2–3):207–222, **1950.** 9 refs., 26 equations. Summaries in German, English and French p. 207–208. **DWB, MH-BH**—An extensive theoretical treatment of the problem of "*compensation*," wherein disturbance in equilibrium of the geostrophic vs. the cyclostrophic field of flow and pressure is followed by a tendency to restore the original balance in flow even though great changes in pressure may result. Application to cyclogenesis and anticyclogenesis taken up with special consideration of each case (effect of a given change in flow or pressure in any given layer in connection with compensatory changes in other layers). *Subject Headings:* **Compensation, Cyclogenesis.**—*M.R.*

9–62 551.515:551.511

Schneider-Carius, Karl, **Die dynamische Bedeutung der Grundschicht.** [The dynamical importance of the ground layer.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 60–65, Bad Kissingen, **1950.** 3 figs., 20 refs. **MH-BH**—In the ground layer there is an ageostrophic component from high towards low pressure, which forms an integral part of the circulation scheme. The upper boundary ("peplopause," about 1 km. in north Germany) disappears in center of a depression. Between anticyclone and depression it forms a downglide surface, in interior of anticyclone it forms lower limit of subsiding air. Origin of surface air flow is not in anticyclones but in disturbed regions in rear of depressions and fronts. *Subject Headings:* **General circulation, Atmospheric disturbances.**—*C.E.P.B.*

9–63 551.515

Scotton, John W., **The first week of 1950 in the United States.** *Weather*, 5(4):131–132, April 1950. **DWB, MH-BH**—Abnormal cold and snow in west, high temperatures in east. *Subject Headings:* **Air mass movements, Abnormal winters, United States.**

9–64 551.515.2

Binkhorst van Oudcarspel, B. G. W., **Met de cumulus in volle storm.** [With the "cumulus" in a whole gale.] *Hemel en Dampking*, 48(5):89–92, May 1950. 5 figs. **DLC**—Excellent photographs of an approaching cold front squall and resulting 45 foot waves, taken from the Dutch weathership at 45°N, 16°W on February 5, 1950 during a 90 knot gale. Chart shows situation in east Atlantic at the time. *Subject Headings:* **Cyclones, Gales, Wind waves, Weather ships.**—*M.R.*

9–65 551.515.3(42)

Bonacina, L. C. W., **Tornadoes across England; the Buckinghamshire tornado.** *Weather*, 5(7):254–255, July 1950. 2 figs. Simmonds, J., **The English tornadoes of 21 May 1950.** *Ibid.*, p. 255–257, July 1950. 2 figs., 3 photos. **DWB**—On May 21, 1950 three tornadoes travelled NE across east England doing great damage. Chart for 18h. shown. Violent thunder and hail (sketches). Width of track 5–15 yards. *Subject Headings:* **Tornadoes, England.**

9–66 551.515.3:551.515.8

Müldner, Willibrord, **Die Windbruchschäden des 22.7.48 im Reichswald bei Nürnberg, ein Beispiel eines Wirbelfeldes als Teilerscheinung einer Böenfront.** [The windfall damage on July 22, 1948 in the National Forest near Nuremberg, an example of a rotation field as a part of a squall front.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 124–127, Bad Kissingen, 1950. 3 figs., 4 refs., equations. **MH-BH**—A cold front with thunder squall and hail brought a nearly stationary whirl, diameter 120–300 m., and some smaller whirls up to 30 m. Maximum wind speed 32 m./sec. Distribution of winds analyzed. Plan of fallen trees and analysis of convergence and divergence lines given. The whirls were due to strong vertical currents of the squall combined with rising warm air over a motor road. *Subject Headings:* **Cold fronts, Wind damage, Nuremberg.**—*C.E.P.B.*

9–67 551.515.7

Lehmann, Martin, **Die Hochdrucklagen als Singularitäten im Witterungsablauf von Mitteldeutschland.** [Anticyclonic situations as singularities in the weather sequence of central Germany.] *Zeitschrift für Meteorologie*, 4(1–2):21–31, Jan.–Feb. 1950. 8 figs., tables, 13 refs. **MH-BH**—A considerable variation was found in the frequency and intensity of anticyclones. The greatest regularity of occurrence was at the end of May and beginning of June. Other well-developed periods were March 11–20, June 18–22 and 26–29, Aug. 25–29 and Sept. 5–8, all of which exceed 50% frequency. The origin is nearly always an offshoot of Azores anticyclone. Eight sequences of weather charts are given to show development but reproduction is poor. *Subject Headings:* **Anticyclones, Central Germany.**—*C.E.P.B.*

9–68 551.515.8

Faust, Heinrich, **Kaltfronten und Kaltfronttypen (Synoptisch-statistische Untersuchung Nr. 3).** [Cold fronts and cold front types (Synoptic statistical study No. 3).] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 151–155, Bad Kissingen, 1950. 4 figs., 2 tables, 18 refs. **MH-BH**—Fronts are classified into: A, Active cold fronts; 1) pure stable (pre-frontal weather phenomena); 2) pure labile (post-frontal weather); 3) main active type (pre- and post-frontal weather). B, Passive cold fronts; 1) labile passive; 2) stable passive. Barograms, thermograms and wind changes are illustrated and tabulated, and seasonal and diurnal percentage frequencies given (8 years). *Subject Heading:* **Cold fronts.**—*C.E.P.B.*

9–69 551.515.8(43)

Hofmann, A., **Luftkörperhäufigkeit in Südwestdeutschland und Singularitäten.** [Air mass frequencies in southwest Germany and singularities.] *Deutscher Wetterdienst in der*

U. S. Zone, Berichte, No. 12, p. 257–262, Bad Kissingen, **1950.** 6 figs., 10 refs. **MH-BH**—Percentage frequencies of different air masses 1881–1941 at Karlsruhe are plotted for each day of the year. By combining different types, frequencies of zonal, meridional and monsoon circulations are obtained and form a systematic basis for singularities. Only a few singularities satisfy a rigid statistical test. Use for long range forecasting depends on their location in individual years and on their succession. *Subject Headings:* **Air mass frequencies, General circulation, Germany.**—*C.E.P.B.*

9–70 551.515.8:621.39

Jones, R. F., **Low-level atmospheric ducts.** *Nature, London*, 165(4207):971, June 17 **1950. DLC**—Short wave radio ducts across Cardigan Bay occurred in air which had travelled mostly over land. No signals in warm-sector air from far to SW. *Subject Headings:* **Atmospheric disturbances, Radio transmission ducts, Cardigan Bay, Wales.**—*C.E.P.B.*

9–71 551.515.8:621.396.

Jones, R. F., **Radar weather echoes. Pt. I.** *Meteorological Magazine, London* 79(934):109–112, April **1950.** 6 photos, 3 refs. Pt. II. *Ibid.*, 79(935):143–145, May 1950 6 photos, 3 refs. Pt. III. *Ibid.*, 79(936):170–172, June 1950. 5 photos, 3 refs. Pt. IV *Ibid.*, 79(937):198–200, July 1950. 6 photos, 3 refs. **MH-BH**—Pt. I and II, Energy backscattered to radar receiver is proportional to ΣND^6, where N is number of drops of diameter D. At distances greater than 10 miles, echo comes from raindrops or ice crystals. Photographs of great interest are reproduced from plan position indicator and height-range tube near Dunstable. They show plans and vertical cross sections of cold and warm fronts. Typical cold front shows a long narrow (5–10 miles) band with columnar structure. Warm front plans show much wider areas of rain; in cross section they show a bright band near freezing level while remainder is diffuse and free from columnar structure. Pt. III, Radar P.P.I. of occlusions indicates that up currents are widespread and fairly uniform in strength. Vertical sections usually resemble warm front echoes rather than cold but are sometimes complex and not capable of being represented by a simple model. Pt. IV, Unusual weather echoes, describes and illustrates (a) wave on a cold front; (b) large ice crystals due to convergence over a wide area; (c, d) precipitation falling from altocumulus; (e) isolated thunderstorm; (f) degenerating thunderstorms. *Subject Headings:* **Fronts, Radar echoes, Rainfall intensity.**

9–72 551.515.8:61(

Kérdö, J., **Neuere Untersuchungen über die Wirkung der Frontendurchgänge auf den Eintritt des Todes.** [Recent investigations on the effect of the passage of fronts on the occurrence of death.] *Wetter und Leben*, 2(1–2):16–23, May **1949.** 2 figs., table. **MH-BH**—Comparison of deaths with days with and without fronts gave no result, but 8-hour periods showed significant maximum frequency of deaths during eight hours including passage of cold or warm fronts. Attributed to effect of electrical phenomena on nervous system. *Subject Headings:* **Fronts, Medical meteorology.**—*C.E.P.B.*

9–73 551.515.8:629.13

§Meyer, Hans Klaus, **Flug durch einen Kaltlufttropfen über See.** [Flight through a cold air mass over the sea.] *Meteorologische Rundschau*, 3(5–6):108–111, May–June **1950.** 6 figs. (including 3 synoptic charts), table, ref. **DWB, MH-BH**—On May 6, 1946 a meteorological flight was made from west to east and north to south through a cold air mass between Ireland and Spain. From this and radiosondes the structure is analyzed. There was a marked inversion at 800–850 mb., clouds St. Cu, Cu. and Cu. Nb. The thermodynamics of a cold air mass over warm sea are compared with those over snow covered land. *Subject Headings:* **Air masses, Aeronautical meteorology, Bay of Biscay.**—*C.E.P.B.*

9–74 551.515.8:551.594.11

Seper, Hans, **Meteorologische Frontdurchgänge und deren Auswirkungen auf das luftelektrische Potential.** [Passage of meteorological fronts and their effect on atmospheric electric potential.] *Wetter und Leben*, 2(5–6):108–110, Oct. **1949.** fig. **DWB**—Autographic records at Vienna Oct. 1947 through June 1948 show generally negative potential gradient

nstead of normal positive fine weather gradient. Three examples of different types of front illustrated. Results agree with Sir George Simpson's (Great Britain, *Geophysical Memoirs* No. 84, 1949). *Subject Headings:* **Fronts, Potential gradient, Vienna.**—*C.E.P.B.*

RADIATION AND TEMPERATURE

RADIATION

9–75 551.52:523.32

Raimond, J. J., Jr., **De temperatuur van de maan.** [The temperature of the moon.] *Hemel en Dampkring*, 48(5):81–84, May **1950.** 2 figs. **DLC**—By measuring radiations in the near infrared (not absorbed by CO_2 as infrared are) the following surface temperatures have been determined for various phases of the moon: center of full moon 100°C., center of the new moon −150°C., average −24°C. and interior −50°C. or −60°C. Methods used by Piddington and Minett in Australia described and illustrated. *Subject Headings:* **Planetary temperatures, Moon.**—*M.R.*

9–76 551.521:551.311.12

Sauberer, F. and Dirmhirn, I., **Die Bedeutung des Strahlungsfaktors für den Gletscherhaushalt.** [The importance of the radiation factor in the economy of glaciers.] *Wetter und Leben*, 2(11–12):248–261, June **1950.** 3 figs., 11 tables, 14 refs. **DWB**—Authors calculate incoming radiation (sun, sky, long wave), outgoing (reflection, long wave) and radiation balance for each month at 3000 meters in Alps. The most variable factor is the reflection from snow surface; albedo varies from 0.8 with new snow to below 0.2 (old dirty ice). Frequent light snowfalls therefore cause negative radiation balance. *Subject Headings:* **Radiation, Albedo, Glaciers, Alps.**—*C.E.P.B.*

9–77 551.521.11:59

Palat, Karl, **Massenreaktion der roten Waldameise (formica rufa pratensis) auf Sonnenbestrahlung.** [Mass reaction of the red forest ant to solar radiation.] *Wetter und Leben*, 2(5–6):110–114, Oct. **1949.** **DWB**—The top of an ant hill necessarily accumulates heat, but direct sunshine is harmful to ants. Sudden irradiation by summer sun causes a panic reaction among all the ants on the upper surface, and a mass evacuation of the area irradiated. *Subject Headings:* **Solar radiation, Zoology.**—*C.E.P.B.*

9–78 551.521.3:551.593.54

Hinzpeter, Hans, **Über Trübungsbestimmungen in Potsdam in den Jahren 1946 und 1947.** [On the turbidity determinations in Potsdam in 1946 and 1947.] *Zeitschrift für Meteorologie*, 4(1–2):1–8, Jan.–Feb. **1950.** 6 figs., 8 tables, 12 refs. **MH-BH**—Actinometer measurements with air mass 10—1.2 were used to determine Linke's turbidity factor T; effective variation was estimated chiefly by the "new" factor θ and Ångström's β. The variation of these factors with origin of air, possible errors and the relation of T and β are discussed. Influence of water vapor on red radiation is illustrated and finally the diurnal and annual variation of turbidity are described. *Subject Headings:* **Turbidity, Actinometry, Potsdam.**—*C.E.P.B.*

9–79 551.521.31

Schulze, Rudolf, **Wirkungsbezogene Strahlenmessung in der Meteorologie.** [Effectively complete radiation measurements in meteorology.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 210–215, Bad Kissingen, **1950.** 9 figs., 6 refs., equations. **MH-BH**—Discussion of effect of radiation on earth's surface must include sky radiation, for which only the Ulbricht sphere has been entirely suitable. Experiments with this show that the global spectrum closely resembles the extraterrestrial solar spectrum and is almost independent of sun's height. The total radiation in small spectral regions varies less than their biological effects. A new cadmium cell is described. *Subject Headings:* **Global radiation, Radiation measurements.**—*C.E.P.B.*

TEMPERATURE

9–80 551.524.

Reidat, Rudolf, **Über den Einsatz der Anomalien im jährlichen Gang der Temperatur** [On the origin of anomalies in the annual variation of temperature.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 83–86, Bad Kissingen, **1950.** 6 figs., table. **MH-BH**—A study of the annual variation of frequency of simultaneous temperature anomalies at Moscow and Edinburgh, and temperature difference Berlin–Helgoland (land-sea). The suggested cause is that aperiodic changes of solar radiation introduce some periodicity into climate through the alternation of advective and convective processes. *Subject Heading:* **Temperature anomalies.**—*C.E.P.B.*

9–81 551.524.3

Lewis, L. F., **Recent climatic trend.** *Meteorological Magazine, London*, 79(937):189–191, July **1950.** fig. **MH-BH**—Figure shows 20-year running averages at Oxford 1815–1949 seasons and year. Spring, summer, autumn, year have risen to highest point in series, winter down to average. *Subject Headings:* **Temperature variations, Climatic trends, Oxford.**

9–82 551.524.3

*Becker, Richard, **Temperaturextreme auf Weltkarten.** [Temperature extremes on world charts.] *Meteorologische Rundschau*, 3(3–4):74–75, March–April **1950.** 2 charts. **DWB**—Highest and lowest air temperatures (°C. not reduced to mean sea level) at a large number of places plotted on Mercator charts. No isotherms. *Subject Heading:* **Temperature extremes.**

9–83 551.524.36 551.555.6

Cameron, D. C., **Topsy-turvy winter.** *Weatherwise*, 3(1):2, 11, Feb. **1950.** fig. **MH-BH**—After a cold, dry January in 1949 the Northwest experienced the coldest and one of the wettest Januaries on record in 1950. Chart shows unusual depths of snow throughout the West. Storm of January 13 in Washington and Oregon unusual for violence of wind and fall of snow west of Cascades. Temperature at Helena, Montana rose 80°F. in 48 hours (Jan. 18–20). In the East the second unusually mild January in succession occurred. *Subject Headings:* **Abnormal winters, Blizzards, United States.**—*M.R.*

9–84 551.524.36

Kretschmer, Gerhard, **Temperatur-Normen der einzelnen Kalender-Tage.** [Temperature normals of individual calendar days.] *Meteorologische Rundschau*, 3(3–4):78, March–April **1950.** 2 tables. **DWB**—A daily normal curve was drawn from monthly mean temperatures at Buchenbühl (Allgäu) and frequencies of departures from it for each month in 1947 and 1948 are given. They range from +10 to −10°C. *Subject Headings:* **Temperature normals, Germany.**—*C.E.P.B.*

9–85 551.524.36:523.47

Visser, S. W., **Baur's betrekkingen tussen zonnenvlekken en strenge winters.** [Baur's correlation between sunspots and severe winters.] *Hemel en Dampkring*, 48(5):85–88, May **1950.** 2 figs., 2 tables. **DLC**—By a statistical and graphical check of Baur's relation between cold winters and 11-year sunspot cycle, the author comes to the following conclusions contrary to those of Baur: (1) The 11-year period is only an average (heavy scattering from 8 to 14 years); (2) The chances are better than average that a cold winter will follow a sunspot maximum (18% against chance of 15%), which though not too impressive is the opposite of Baur's conclusions; (3) Baur averaged De Bilt, Berlin and Vienna temperatures, and De Bilt is often opposite in anomaly to the other two; (4) Baur ignored upward trend in 1761–1941 data which began about 1800; (5) Sunspot numbers between 1761 and 1830 are unreliable. *Subject Headings:* **Sunspot cycles, Abnormal winters, Western Europe.**—*M.R.*

9–86 551.524.37:635

Schnelle, Fritz, **Kleinklimatische Geländeaufnahme am Beispiel der Frostschäden im Obstbau.** [Local climatic surveys e.g. frost damage to fruit culture.] *Deutscher Wetterdienst*

in der U. S. Zone, Berichte, No. 12, p. 99–104, Bad Kissingen, **1950.** 5 figs., 3 refs. **MH-BH**—In a few valleys of the Odenwald the upper limits of the zone liable to frost were found by previous experience of fruit growers, results of temperature measurements, observations of valley fog and topography. Between different sections of the valleys the cold air is blocked by narrowings or windings. In winding valleys, deflection of cold air stream causes differences between opposite sides. *Subject Headings:* **Frosts, Fruit culture, Odenwald, Germany.**—*C.E.P.B.*

9–87 551.524.4

Brocks, Karl, **Temperatur und Austausch in der untersten Atmosphäre.** [Temperature and exchange in the lowest atmosphere.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 166–170, Bad Kissingen, **1950.** 4 figs., 16 refs., equations. **MH-BH**—The vertical variation with temperature in the lowest layer (up to over 100 meters) depends on lability or stability (inversion) due to ground-air temperature difference. The height function of potential temperature follows a power law with negative index in labile and positive in stable air, and is a measure of vertical exchange. The frequency distribution of the indices at different heights is shown in diagrams. *Subject Headings:* **Micrometeorology, Lapse rates, Turbulent exchange.**—*C.E.P.B.*

9–88 551.524.7:551.501.45

Crossley, A. F., **Relation between the standard deviations of temperature at constant pressure and at constant height.** *Royal Meteorological Society, Quarterly Journal*, 76(329):337–340, July **1950.** 2 tables, ref., 3 equations. **MH-BH**—An equation is developed giving standard deviation of temperature at constant pressure in terms of S.D. at constant height less terms involving variation of temperature with pressure. Some observed S.D.'s given for comparison agree well with calculated values. *Subject Heading:* **Upper air temperatures.**

9–89 551.524.7:551.576.11:621.396.9

Jones, R. F., **The temperatures at the tops of radar echoes associated with various cloud systems.** *Royal Meteorological Society, Quarterly Journal*, 76(329):312–330, July **1950.** 5 figs., 4 tables, 12 refs. Discussion p. 330–336. **MH-BH**—Discussion of 1,200 photographs of radar echoes, also investigated by aircraft. Temperatures at tops of 164 echoes estimated (frequency table given). From associated weather types it is concluded that temperature at top of an echo gives a good indication of strength of vertical currents. An explanation is discussed and it is suggested that in strong vertical currents rain forms without assistance of ice crystals. The strong echoes from thunderstorms are tentatively explained. *Subject Headings:* **Upper air temperatures, Clouds, Radar echoes.**

PRESSURE AND WIND

PRESSURE

9–90 551.541:551.551

Harrison, W. L., **Rapid barometric and wind direction changes, North Atlantic Ocean.** *Marine Observer*, 20(149):141, July **1950.** table. **MH-BH**—Rapid oscillations of 2–3 mb. and direction changes 30–40° at intervals of 15–50 minutes, 23 Sept. 1949, in 23°4′N, 16°43′W. *Subject Headings:* **Pressure oscillations, Wind variations, North Atlantic ocean.**

9–91 551.541

Scorer, R. S., **Gravity waves.** *Weather*, 5(7):262–263, July **1950.** **DWB**—Sudden jumps of pressure attributed to weight of heavy rain in a moving air mass. *Subject Heading:* **Pressure jump.**

9–92 551.596.1:551.543:534

Scorer, R. S., **The dispersion of a pressure pulse in the atmosphere.** *Royal Society of London, Proceedings, Ser. A*, 201(1064):137–157, March 7, **1950.** 13 figs., 2 tables, 16 refs., 55 equations. **DLC**—The amplitude and form of a pressure oscillation, as related to the

magnitude of and distance from a great explosion, is derived by Fourier's analysis; assumin a model atmosphere with constant lapse rate in the troposphere, a constant level tropopaus an isothermal stratosphere and no wind. The solution is compared with actual observatior made at varying distances from the Great Siberian Meteorite (1908) and the Krakatoa eruptic (1883). The error in the theoretical derivation was apparently due to ignoring high tempera tures in the ozonosphere. The calculated distance of dissipation of energy was too short an a second series of waves not predicted; but a more realistic model of the atmosphere woul involve calculations beyond the realm of practicability. *Subject Headings:* **Acoustical phe nomena, Pressure oscillations, Explosion waves.**—*M.R.*

9–93 551.596.1:551.511:551.541:53

Taylor, Geoffrey, **The formation of a blast wave by a very intense explosion. I. Theoret cal discussion.** *Royal Society of London, Proceedings, Ser. A*, 201(1065):159–174, March 2 **1950.** 5 figs., 5 tables, 2 refs., 53 equations. **II. The atomic explosion of 1945.** *Ibid.*, 175–186. 5 figs., 3 plates, 5 tables, 4 refs., 32 equations. **DLC**—Theoretical problems co nected with the energy dissipation from an intense explosion (with no gas release) are treate in detail in Pt. I. The energy, form and time of decay of the blast wave; similarity to soun wave propagation; heat energy remaining in the air after its return to atmospheric pressur and comparison with blasts from high explosives are determined mathematically and expresse in tables and graphs. In Pt. II, the theoretical results are checked against measuremen made from photographs of the 1945 atomic explosion in New Mexico. The prediction that R^5 would be proportional to t was verified for a range R = 20 to 185m. Total energy was calculate as between 4.1 and 14.4×10^{20} ergs, depending on the assumed value of γ. After the sho wave, the rate of rise of hot air was 35 m/sec. compared with a rate of 35.7 m/sec. which wa predicted under the assumption that, in the absence of turbulent mixing with cold air, the ga would rise like a large bubble of water (293m. radius). *Subject Headings:* **Acoustical phe nomena, Atmospheric circulation, Explosion waves.**—*M.R.*

9–94 551.543

Brandtner, Erwin, **Beiträge zur Statistik polarer Luftdruckwellen.** [Contribution to th statistics of polar pressure waves.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 1 p. 65–81, Bad Kissingen, **1950.** 7 figs., table, 13 refs. **MH-BH**—For each winter half-yea 1912–1913—1947–1948 a complete periodogram 8–80 days was calculated for pressure a Spitsbergen. Harmonic dials and "random walks" given for 72, 30, 22 and 11.3 day wave Seventy-two day wave most frequent but seldom dominant; its relation to calendar makes probably a harmonic of the year. Thirty day wave rarely exceeds 4 mb. but persistent a constant phase. Twenty to twenty-four and 11.3 day waves independent of calendar bu often dominant. A forty day wave is also frequent. *Subject Headings:* **Pressure wave Periodicities.**—*C.E.P.B.*

9–95 551.547

Noth, Hermann, **Die Tropopause über Strassburg im Januar und Februar 1949 un einige Schlussfolgerungen.** [The tropopause over Strassburg in Jan. and Feb. 1949 and son consequences.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 263–265, Ba Kissingen, **1950.** 3 figs., ref. **MH-BH**—From radiosonde ascents thicknesses of 100–22 mb. and 225–500 mb. levels were plotted; correlation coefficients negative. Discussed in term of "neutral point" between stratosphere and troposphere. *Subject Headings:* **Upper a pressure, Tropopause, Strassburg, Germany.**—*C.E.P.B.*

WIND

9–96 551.509.3 551.5

§Dallant, (Comdr.), **Les particularités du régime des vents à Menton; contribution l'étude du climat de la Côte d'Azur.** [Peculiarities of the wind regime at Menton; contributio to the study of the climate of the Cote d'Azur.] *La Météorologie*, 4 Ser. No. 15:179–18 July–Sept. **1949.** 2 figs. **MH-BH**—A brief study of synoptic conditions on the south coas of France illustrated by analyzed charts for western Europe for Nov. 9 and 22, 1948. *Subje Headings:* **Local winds, Synoptic analysis, French Riviera, France.**—*M.R.*

9–97 551.55:551.582:629.13(661)

Leluin, P., **Le temps à Port-Étienne.** [The weather at Port-Étienne.] *La Météorologie*, 4 Ser. No. 15:147–156, July–Sept. **1949.** fig., 7 tables. Summary in French and English p. 147. **MH-BH**—The weather at Port-Étienne (lat. 21°N.) is seldom controlled by either extratropical or intertropical frontal disturbances, but mostly by the prevailing winds. Rainfall, cloudiness, visibility and surface winds are analyzed in connection with the seasonal air flow regime and forecasting discussed on the basis of the location of the Intertropical Front. *Subject Headings:* **Aviation, Trade winds, Tropical meteorology, Climatology, French West Africa.**—*M.R.*

9–98 551.55:62

Stumpf, Franz, **Energie aus der Luft.** [Energy from the air.] *Natur und Technik, Vienna*, 3(6):175–177, **1949.** 2 figs., photo, equation. **DLC**—Wind power generators described and illustrated. Quantitative data given for calculating power (KW) derived from winds of various speeds. *Subject Headings:* **Wind generators, Computation tables.**—*M.R.*

9–99 551.551:629.13

Research into clear air gusts. *Aeroplane, London*, 78(2020):237–238, Feb. 24, **1950.** 2 photos. **DLC**—Results of 2 years of investigation by B.E.A.'s Gust Research Unit into the problem of sudden gusts at 15–35 thousand feet over western Europe. Nineteen gust areas were encountered. Usually regions of gustiness are thin but range from 1500 to 12,000 feet in thickness, from 50 to 500 miles extent, and in intensity from 7.5 (0.2 g) to 26 ft/sec. (0.7 g). Turbulent areas are found more often at the tropopause than above or below it. The most intense disturbances were in the vicinity of the jet stream. *Subject Headings:* **Turbulence, Gusts, Aviation.**—*M.R.*

9–100 551.552:551.4

Steinhauser, F., **Windverstärkung an Gebirgszügen.** [Increase of wind on mountain ranges.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 27–28, Bad Kissingen, **1950. MH-BH**—Stations close on either side of Little Carpathian range (400–600 meters above plain) show greatest frequency of stormy winds to lee of high ground. *Subject Headings:* **Wind distribution, Orographic effects, Carpathians.**—*C.E.P.B.*

9–101 551.554

Gordon, A. H., **The ratio between observed velocities of the wind at 50 feet and 2000 feet over the North Atlantic Ocean.** *Royal Meteorological Society, Quarterly Journal*, 76(329):344–348, July **1950.** 2 figs., 2 tables, 3 refs. **MH-BH**—From observations in ocean weather ships in 60°N, 20°W and 53°50′N, 18°40′W, 926 ratios v_{50}/v_{2000} were found and classified according to lapse rate. Smoothed values range from 0.56 (inversion) to 0.70 (no lapse), 0.62 (lapse 4–5°F./2000 ft.) then increasing to 0.81 (13–14°F./2000 ft.). Results generally agree with Frost's calculations. *Subject Headings:* **Wind shear, Lapse rates, North Atlantic Ocean.**

9–102 551.554

†*Polli, Silvio, **100 anni di osservazioni meteorologiche eseguite a Trieste 1841–1940. Parte IV: La velocita del vento.** [One hundred years of meteorological observations carried out at Trieste, 1841–1940. Part IV: Wind velocity.] *Istituto Talassografico, Pubblicazioni*, No. 234:42–87, **1949.** 22 tables, 62 refs. (Reprint available.) **MH-BH**—This monograph contains extensive tabular data on average, extreme and percentage frequency of winds at Trieste during each month of the period 1865–1947, together with 15 pages of explanation of the tables, description of wind instruments and recorders used during the period, exposure of instruments, peculiar local winds and over three pages of bibliography. *Subject Headings:* **Wind velocity, Wind distribution, Trieste.**—*M.R.*

9–103 551.555.3

Rossmann, F., **Über das Absteigen den Föhns in die Täler.** [On the descent of the föhn into valleys.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 94–98, Bad Kissingen, **1950.** 2 cloud photos, 3 refs., equations. **MH-BH**—The dynamic theories of the

descent of warm föhn air into valleys present difficulties. The "föhn wall" is always more o less developed and author produces data to show that descending föhn is due to moist—labil sinking of air in clouds of föhn wall. Peculiarities of föhn discussed, including abnorma visibility. *Subject Headings:* **Föhn winds, Orographic effects.**—*C.E.P.B.*

9–104 551.555.4

Schramm, Anton, **Der "Böhmische Wind" im Bereich des Oberpfälzer Waldes und de Böhmerwaldes.** [The "Böhmer wind" in the region of the Oberpfälzer Wald and Böhmer wald.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 136–137, Bad Kissingen 1950. **MH-BH**—The cold, dry katabatic wind is described, the synoptic conditions for it formation briefly set out and its regional and seasonal distribution given. *Subject Headings* **Special winds, Bavaria, Germany.**—*C.E.P.B.*

9–105 551.557:551.51

Bannon, J. K., **Shear frequencies in the upper troposphere and lower stratosphere ove England.** *Meteorological Magazine, London*, 79(936):161–165, June 1950. 5 tables, ref equation. **DWB**—Tables 1–4 give frequencies and mean values of vertical shear (change o vector wind in kt./1000 ft.) and log Richardson number at Larkhill in four months, at 450, 30 and 200 mb. levels, in stratosphere, troposphere and just above or at tropopause. Table gives frequencies and mean horizontal shear per hour at right angles to vector wind, correcte for curvature, at the same levels. *Subject Headings:* **Wind shear, Upper air winds, England**

AQUEOUS VAPOR AND HYDROMETEORS

HUMIDITY AND EVAPORATION

9–106 551.571.3

Matthews, L. S., **Low dew point at Khartoum.** *Weather*, 5(7):263, July 1950, table **DWB**—On May 6, 1950, dew point fell from 15.5 to −1.2°C. between 18 and 21h. Attribute to a "subsidence funnel." *Subject Headings:* **Dew point, Khartoum, Anglo-Egyptian Sudan.**

9–107 551.571.4 551.57

Frankenberger, Ernst, **Über das vertikale Gefälle der Luftfeuchtigkeit und die Verdunstung bei Quickborn/Holst.** [On the vertical gradient of humidity and evaporation a Quickborn/Holst.] *Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12, p. 45–51, Bad Kissingen, 1950. 4 figs., table, ref., equations. **MH-BH**—Specific humidity measured hourly at 2, 13, 28 and 70 m. height on 29 days, using electrically ventilated instruments. These gave the *austausch* coefficients at various heights and temperatures. The ratio 1.4:1 between vertical coefficients for heat and humidity, and for momentum, was confirmed. Evaporation was calculated from humidity gradient and *austausch* coefficient for rain days and days with wet and dry ground. *Subject Headings:* **Humidity lapse-rate, Evaporation, Turbulent exchange.**—*C.E.P.B.*

9–108 551.554:551.571.4:551.573:551.508.72

Pasquill, F., **Some further considerations of the measurement and indirect evaluation o natural evaporation.** *Royal Meteorological Society, Quarterly Journal*, 76(329):287–301, July 1950. 2 figs., 5 tables, 6 refs., 7 equations. **MH-BH**—Sets out results of further measure ments of evaporation from the soil and associated vertical profiles of wind velocity and vapo pressure 0–2 meters. The site was clayland pasture, conditions mainly adiabatic. The observed rates of evaporation are compared with those calculated from an expression involving wind velocity and specific humidity at two heights above effective zero. The agreement wa good. Possible application to evaporation from crops is discussed. *Subject Headings:* **Evaporation, Turbulent exchange.**

9–109 551.573 551.577.2

†*Simojoki, Heikki, **Niederschlag und Verdunstung auf dem Baltischen Meer.** [Precipita tion and evaporation in the Baltic Sea.] *University of Helsinki, Institute of Meteorology*

Papers, No. 64, 1949. 25 p. 5 figs., 2+tables, 18 refs., 2 equations. Summary in English p. 22. (Reprint from Fennia 71.) **MH-BH**—Precipitation records, for 78 places along the coast and on islands in the Baltic, are reduced to the period 1886–1935 and isohyetal charts prepared therefrom. The variations from sea to land and from month to month are analyzed and discussed in connection with the dynamic processes involved. Special consideration is given to the problem of evaporation over the Baltic, and to convective showers in the summer. *Subject Headings:* **Precipitation distribution, Evaporation, Baltic Sea.**—*M.R.*

9–110 551.573:551.554

Yamamoto, Gi-ichi, **Investigations of evaporation from pans.** *American Geophysical Union, Transactions*, 31(3):349–356, June **1950.** 6 figs., 10 refs., 25 equations. **MH-BH**—An experimental study of the relationships between rate of evaporation and wind velocity. The analogy between the physical processes of heat transfer and evaporation yields theoretical equations for evaporation from pans into still and into moving air under laminar and turbulent boundary conditions. The empirical equations relating evaporation and wind velocity, obtained in an Eiffel wind tunnel using a water surface covered with blotting paper to prevent spraying, are in agreement with the theoretical results. Data on evaporation from pans of varying sizes and varying wind velocities indicate that the change between laminar and turbulent flow takes place suddenly and without any noticeable transition at a Reynold's number F $\log_{10}$4.75. When the usual evaporation pan is used, the water surface becomes turbulent even for small Reynold's numbers. Relations are illustrated by numerous scatter diagrams. *Subject Headings:* **Evaporation, Wind effects, Turbulent exchange.**—*I.L.D.*

RAINFALL

9–111 551.577:621.396.9

McLarren, Robert, **What does rain do to radar?** *Aviation Week*, 51(24):21–22, 24, Dec. 12, **1949.** fig., 9 refs., equation. **DLC**—Interference due to precipitation attenuates radar pulses. Investigations by U. S. Navy and Civil Aeronautics Authority aimed at improving signal strength, described. Also attempts made to improve detection of weak signals. *Subject Headings:* **Radar propagation, Rainfall attenuation.**—*M.R.*

9–112 551.594.25:551.577.11:621.396.9

Hooper, J. E. N. and Kippax, A. A., **The bright band—a phenomenon associated with radar echoes from falling rain.** *Royal Meteorological Society, Quarterly Journal*, 76(328):125–132, April **1950.** 3 figs., 5 tables. **DWB**—Frontal rain traversed by a vertical radar beam gives a bright band due to an echo 5 to 9 times the strength below and above. The band is 300–400 ft. below freezing level. It is attributed to the level at which snowflakes have melted but water drops have not reached their terminal velocity. Calculations from velocity of fall of snowflakes and resultant water drops show that magnitude of echo confirms this explanation. Bright line is less pronounced from instability showers. *Subject Headings:* **Bright band echoes, Radar.**

9–113 551.511:551.577.2

Becker, Richard, **Eine Darstellung der mittleren Niederschlagsmengen in Verbindung mit der Expansionsarbeit.** [An exposition of the average rainfall amounts in relation to the work of expansion.] *Annalen der Meteorologie*, 3(3–4):115–118, **1950.** 2 figs., 4 refs. Summaries in German and English p. 115. **DWB, MH-BH**—Thermodynamic cycles in the atmosphere give a net yield of work in overcoming friction. A measure of this can be found from mean annual temperature and rainfall, under certain assumptions, using Stüve's adiabatic paper. The average expansive work of the atmosphere over the Atlantic is charted in 1000 HP per sq. km., showing maxima of 12 in 50–60°N and 40–55°S, minima of 1 in 20°N and S. *Subject Headings:* **Thermodynamics of the atmosphere, Precipitation intensity.**—*C.E.P.B.*

9–114 551.577.2:63(94)

*Gentilli, J., **Rainfall and climate in western Australia and the rainfall-wheat relationship.** Nedlands, W. A., **1946.** 37 leaves. tables, fold. maps, 15 refs. **MH-BH**—A useful mimeo-

graphed study, accompanied by detailed tables and charts. It includes a discussion of the mean annual rainfall, of the wheat belt in western Australia, the deviation of rainfall, rainfall per wet day, probability of drought, rainfall effectiveness, standard deviation of monthly rainfall and the correlation between monthly rainfall and wheat yield. *Subject Headings:* **Rainfall distribution, Agricultural climatology, Western Australia.**—*P.M.*

9–115 551.577.31

Schmauss, A., **Tageszeitgebundene Wettervorgänge.** [Weather processes related to time of day.] *Deutscher Wetterdienst in der U. S. Zone, Berichte,* No. 12, p. 24–27, **1950.** 2 figs., 7 refs. **MH-BH**—Curves show diurnal variation of frequency of beginning and end of precipitation at Potsdam 1893–1933, by ½-hour intervals smoothed, year and summer. *Subject Headings:* **Precipitation variations, Potsdam.**—*C.E.P.B.*

9–116 551.577.34

Schluze, Alfred, **Bemerkungen zur Frage der zunehmenden Kontinentalität im europäischen Raum im Hinblick auf die Niederschlagsmenge.** [Remarks on the question of the increasing continentality in the European region in regard to amount of precipitation.] *Deutscher Wetterdienst in der U. S. Zone, Berichte,* No. 12, p. 177–179, Bad Kissingen, **1950.** 5 figs., 7 refs. **MH-BH**—Illustrations show changes of mean values as rainfall record increases for a number of stations in Europe (year, winter, summer, May–July minus Aug.–Oct.). They show no evidence for an increase of continentality but rather increasing rainfall. *Subject Headings:* **Precipitation variations, Europe.**—*C.E.P.B.*

9–117 551.577.36(931)

*Seelye, C. J., **Rainfall intensities at Wellington, N. Z.** *New Zealand Institution of Engineers, Proceedings,* 33:452–466, **1947.** 3 figs., 12 tables, 4 refs., 17 equations. (Reprint available.) **MH-BH**—Statistical methods are applied to data from an 81 year rainfall record and autographic records for 18 years, to show depth duration frequencies of hourly, daily and 3 day rainfall averages and extremes. *Subject Headings:* **Rainfall intensity, Rainfall depth duration frequencies, Wellington, New Zealand.**—*M.R.*

9–118 551.577.36(931)

*Seelye, C. J., **The frequency of heavy rainfalls in New Zealand.** New Zealand Science Congress, p. 66–70, **1947.** 2 maps, tables, 3 refs., equations. (New Zealand Meteorological Service, Meteorological Office Note No. 33.) **MH-BH**—Statistical analysis of rainfall data from 37 stations with 30 to over 90 years of record, to show the greatest daily rainfall likely to occur in 1 year, 10 years or 100 years at each place. Accuracy tested by Poisson distribution. *Subject Headings:* **Rainfall frequencies, Rainfall extremes, New Zealand.**—*M.R.*

9–119 551.577.37:63

Visher, Stephen S., **Wet seasons in the United States: How wet and how frequent.** *Ecology,* 31(2):292–303, April **1950.** 16 figs., table, 12 refs. **DLC**—Seasonal precipitation data for the U.S.A. (1886–1940) are analyzed and used to prepare crude but interesting charts showing the amount of precipitation during the wettest year on record, during the season which was the upper limit of the 4th quintile (80%), and the frequency of years with >15″ and >20″ of precipitation in each of the four seasons, respectively. The adverse effect of these very wet seasons on economic, social and agricultural conditions in areas (mostly in the Gulf States) where wet seasons occur frequently, is believed to outweigh the beneficial effect of plentiful moisture. *Subject Headings:* **Rainfall extremes, Ecology, United States.**—*M.R.*

9–120 551.577.51(43)

Dammann, Walter, **Die dynamische und statische Komponente im jährlichen Gang der Niederschläge in Nordwestdeutschland.** [The dynamic and static components in the annual variation of the rainfall of northwestern Germany.] *Deutscher Wetterdienst in der U. S. Zone Berichte,* No. 12, p. 252–256, Bad Kissingen, **1950.** 5 figs., 5 tables, 5 refs. **MH-BH**—In spite of the uniform succession of rain bearing weather situations (dynamic component) the local differences of rainfall are very great (static component). Illustrated by month of least precipi-

tation, which forms layers progressing obliquely upwards from February to May. This is attributed to the rise of the condensation level in spring. *Subject Headings:* **Rainfall variations, Topographic effects, Northwest Germany.**—*C.E.P.B.*

SNOW

9–121 551.578.4:551.311.128

Cregar, Mary-Rebecca and Melloncamp, Wilde R., **The meteorology of avalanches**—1. *Weatherwise*, 3(1):3–6, 14, Feb. **1950.** 6 figs. Pt. II, *ibid.*, 3(2):35–37, 46, April **1950.** 4 figs. **MH-BH**—A general discussion of the factors which determine the cohesion of snow, with special emphasis on study of the crystalline structure of snow with varying temperature and moisture conditions in combination with density, slope, surface, wind, etc. Work done by Forest Service at Alta, Utah, in obtaining 10 years of weather and avalanche records, and by authors at same place, in sampling snow structure by means of an original *snow ram*—the only known avalanche instrument. *Subject Headings:* **Avalanches, Snow sampling, Utah.**—*M.R.*

9–122 551.578.45:551.509.3

*§Mironovitch, V., **Conditions synoptiques de fortes chutes de neige dans la région parisienne; étude statistique et synoptique.** [Synoptic conditions of heavy snowfalls in the Paris region; statistical and synoptic study.] *La Météorologie*, 4 Ser. No. 15:132–146, July–Sept. **1949.** 7 figs., 4 tables, 2 refs. Summary in French and English p. 132. **MH-BH**—The results of a statistical analysis of 138 snowstorms in Paris (1872–1948) are presented as monthly frequencies of various synoptic types which accompanied various intensities of snowfall. In every case a depression was over or near France and the snow resulted from confluence of maritime Arctic and Mediterranean air in the immediate vicinity. Two cases are analyzed in detail (synoptically and aerologically), and three exceptional cases (one when the snowstorm lasted 60 hours) discussed. *Subject Headings:* **Snowstorms, Synoptic analysis, Paris, France.**—*M.R.*

9–123 551.578.45

§Poulter, R. M., **April snow in southern England.** *Weather*, 5(6):209–210, June **1950.** fig., 3 photos. **DWB**—Weather and damage in "blizzard" on April 26, 1950. *Subject Headings:* **Snowstorms, England.**

9–124 551.578.46

Hillischer, H., **Die Schneegrenze und ihre Bestimmung.** [The snow line and its determination.] *Natur und Technik, Vienna*, 3(6):172–174, **1949.** 2 figs. **DLC**—Methods of determining the variations in snow line in the Alps; seasonal, long term and temporary changes (due to föhns etc.); and variations with slope, vegetation and exposure considered. *Subject Headings:* **Snow line, Alps.**—*M.R.*

9–125 551.578.46:551.311.128

Niggli, Paul, **The science of snow and avalanches.** *New York Academy of Sciences, Transactions, Ser. 2*, 10(4):127–135, Feb. **1948.** **DLC**—Text of an illustrated lecture discussing effects of snow crystal characteristics, radiation, conductivity etc. on snow accumulation. Research done at the Weissfluhjoch near Davos, Switzerland. *Subject Headings:* **Avalanches, Snow accumulation, Switzerland.**—*M.R.*

HYDROMETEOROLOGY

9–126 551.579

Morel, P., **Hydrométéorologie pratique de quelques bassins des Alpes.** [Practical hydrometeorology of some basins of the Alps.] *La Météorologie*, 4 Ser., No. 15:182–184, July–Sept. **1949.** formulas. **MH-BH**—A simple formula $D=P/100\times M\times K^t$ is used to calculate the runoff deficit from nature and amount of precipitation, mean temperature of the basin, slope, soil, and relief in mountain regions. Monthly and annual forecasts based on

reserve liquid have been based on another formula, which is discussed. *Subject Headings:* **Hydrometeorology, Runoff, Alps, France.**—*M.R.*

9–127 551.579:551.588.6

Roessel, B. W. P., **Hydrologic problems concerning the runoff in headwater regions.** *American Geophysical Union, Transactions*, 31(3):431–442, June **1950.** 14 figs., 6 tables, 34 refs. **MH-BH**—The author discusses some concepts of the roles of surface, subsurface and ground water runoff in watershed hydrology. Data from various studies indicate that true ground water discharge may form the major part of flood flows while the contributions of surface runoff are either minor or nil. Experiments with sand troughs to determine the effect of length of *aquifer* are used to explain apparent contradictions to this relationship manifested in *Emmental* watersheds. It is postulated that length of *aquifer* is a factor controlling storage of ground water and sensitivity of stream flow to rainfall. Since outflow is controlled by rate of filling, the same volume of ground water storage did not always produce the same runoff rate both in the sand troughs and in the watersheds. Article supported by much graphic material. *Subject Headings:* **Runoff, Watersheds, Forest influences, Switzerland.**—*I.L.D.*

9–128 551.579(81)

Sternberg, Hilgard O'Reilly, **The distribution of water power resources in Brazil with reference to the participation ratio concept.** *Association of American Geographers, Annals*, 38(2):133–146, June **1948.** 2 figs., table, 19 refs. **DLC**—*Subject Headings:* **Hydrometeorology, Brazil.**

9–129 551.579.4:551.577.37

*Benson, Manuel A., **Use of historical data in flood-frequency analysis.** *American Geophysical Union, Transactions*, 31(3):419–424, June **1950.** 2 figs., 2 tables, ref. **MH-BH**—A flood frequency study for the Susquehanna River at Harrisburg, Pa., led to the conclusion that hitherto available techniques for combining historical and recent flood data failed to give a well-defined frequency curve. To obtain a consistent curve all points must be based upon the same period of record. Since it was known that the missing historical years of record had annual peak floods less than 340,000 cfs, it was assumed that the same distribution of floods below 340,000 cfs occurred during the missing years as is known to have occurred during the recent period. The method of computation involved an adjusting of order numbers for all items below 340,000 cfs. This method gave consistent set of points and a well-defined frequency curve. Data for annual floods 1786–1947 (continuous 1874–1947), presented in chronological order and plotted on scatter diagram. *Subject Headings:* **Flood frequencies, Hydrologic data, Susquehanna River.**—*I.L.D.*

9–130 551.579.4

Boughner, C. C., **The Red River flood—spring 1950.** *Weather*, 5(7):241–245, July **1950.** 2 figs., photo, map, 2 tables, 6 refs. **DWB**—Causes of flood—heavy autumn rains, cold snowy winter, late spring, heavy rain April and May. Daily flood levels given, peak May 11–24. *Subject Headings:* **Floods, Red River of the North, Canada.**

9–131 551.579.5:633.1

Stoltenberg, N. L. and Wilson, T. V., **Interception storage of rainfall by corn plants.** *American Geophysical Union, Transactions*, 31(3):443–448, June **1950.** 3 tables, 4 refs. **MH-BH**—The process of interception of rainfall by corn plants is described, and the concepts of transitory and residual interception storage are defined. The authors describe an experimental procedure for determining values for these components of interception storage under varying conditions of artificial rainfall. The dominant factor affecting interception storage on mature corn plants is size of the plant population. The amount and rate of rainfall influence slightly the residual storage after sufficient rain has fallen to fill the storage pockets. The maximum residual interception storage of 0.02 in. for a corn population of 15,000 plants per acre is much smaller than that hitherto accepted. *Subject Headings:* **Precipitation interception, Soil moisture.**—*I.L.D.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATE OF PARTICULAR PLACES

9–132 551.582(481)

*Birkeland, B. J. **Old meteorological observations at Trondheim. Atmospheric pressure and temperature during 185 years.** *Geofysiske Publikasjoner* 17(5) **1949.** 38 p. 8 tables. **DWB, MH-BH**—Records of temperature and pressure made at or near Trondheim during a 185-year period (1761–1946) are presented in detail, along with biographical material on each of the observers and description of exposures, instruments, methods of reduction and correction of data etc. Not only the monthly and annual means, but the departures from "normal," the means for various periods, the extremes of pressure and temperature, and some precipitation data (1854–1885) are tabulated and discussed. *Subject Headings:* **Climatology, Historic weather records, Trondheim, Norway.**—*M.R.*

9–133 551.582:656.7(61,62)

Great Britain. Meteorological Office, **Aviation meteorology of the route Castel Benito—Cairo.** London, H. M. Stationery Office, **1950.** 46 p. 9 figs., 2 tables, 12 refs., 21 p. tables in append. (*Great Britain, Meteorological Office, Meteorological Reports*, No. 5.) At head of title: M.O.496e. **MH-BH**—Pt. I, Synoptic meteorology—situation and relief, meteorological regime of eastern Mediterranean, depressions and fronts, characteristics of air masses, seasonal weather, sandstorms and rising sand. Pt. II, Climate, including flying fitness, sea and swell and influence of climate on radio propagation. Charts show tracks of depressions and air masses, rainfall Jan., April, July, Oct. Appendices give general long period climatic summaries for 10 stations, visibility tables, heights of cloud base, upper winds and upper air temperatures both to 18,000 feet. *Subject Headings:* **Aeronautical meteorology, Aviation climatology, Libya, Egypt.**—*C.E.P.B.*

9–134 551.582(267) 551.589:629.13

*§Hogan, J., **Meteorology of the Indian Ocean area between western Australia and India.** *Australia, Meteorological Branch, Bulletin*, No. 40, **1948.** 88 p. 24 synoptic charts, graph, numerous tables. **DWB**—A discussion of the synoptic conditions and flying weather over the air route between Perth and Colombo, based on material and experience acquired during the late war. There is a discussion of weather and winds, south and north of the Cocos Islands, respectively, for each month from October through May and likewise for the season June through September. There are over 40 pages of analyzed synoptic charts for the Indian Ocean area; tables of seasonal upper air wind direction and speed by zones, and tables of frequency and height of cloud layers by seasons. *Subject Headings:* **Synoptic analysis, Aeronautical meteorology, Climatology, Indian Ocean.**—*M.R.*

9–135 551.582(265.5)

Seelye, C. J., (ed.), **Climatological notes. South Pacific Region.** *New Zealand Meteorological Office, Ser. C*, No. 1–19, **1943.** figs., charts, tables, refs. **DLC**—A series of 19 concise, but analytical studies based on meteorological records varying from 3 to 42 years in length, for individual islands or groups of islands in the South Pacific. The text is well supported by topographic charts, graphs, surface and upper air wind roses (Baillie type), and by tables of average and extreme values and frequencies of the various climatic elements. The general order of treatment is: description of island and history of observations, wind, visibility, cloud, rain, temperature, humidity, thunderstorm and sea conditions. Upper wind data and roses are included for Samoa, Tonga, Tahiti, Kermadecs (Raoul Is.) and Fiji. Wherever literature is available, bibliographies are included. The studies include the climate of: (1) Penrhyn Island, (2) Manihiki Island, (3) Pukapuka—Danger Island, (4) Aitutaki Island, (5) Rarotonga, (6) Niue Island, (7) Pitcairn Island, (8) Tonga Group, (9) Kermadecs (Raoul Island), (10) Chatham Islands, (1) Fanning Island, (12) Malden Island, (13) Gilbert Group, (14) Ellice Group, (15) Tokelau Group, (16) Samoa, (17) Rotuma Island, (18) Fiji, (19) Tahiti. *Subject Headings:* **Climatology, Upper air winds, South Pacific Islands.**—*M.R.*

9–136 551.582.2:62

Bernard, Merrill, **The role of climatology in engineering.** *American Meteorological Society, Bulletin*, 31(6):194–196, June **1950. DWB, MH-BH**—Tabulated frequencies of the occurrence of weather elements, such as rain, snow, heat, wind and humidity observed over a decade or more, constitute a tool for design of industrial and engineering structures and other long range planning. Such probabilities really constitute a "forecast." The importance of having the data readily compilable (on punched cards) is stressed. *Subject Headings:* **Climatology, Industrial meteorology.**—*M.R.*

9–137 551.582.3(266)

*Great Britain. Meteorological Office. **Monthly meteorological charts of the eastern Pacific Ocean.** London, H. M. Stationery Office, **1950.** 122 p. 320 charts. (Prepared in the Marine Branch of the Meteorological Office.) At head of title: M.O. 518 (formerly M.O.M. 446). **MH-BH**—Charts of area 60°N to 60°S, 160°W to coast of America. Includes for each month charts of resultant winds or vector means, barometric pressure and resultant winds, frequency of winds of gale force (Beaufort 7 or higher), predominant direction, constancy and force of surface winds, wind roses for each 5° square. Frequency, amount and direction of swell (swell roses). Percentage frequency of fog, fog mist and haze, snow, precipitation, lightning. Mean cloud amount and percentage frequency of clear, fair and cloudy or overcast skies. Mean maximum, minimum and range of air and sea temperature and difference air—sea, typical tracks of tropical cyclones. Introduction includes tables of diurnal variation of barometric pressure in 10° zones, 20°N–20°S. *Subject Headings:* **Climatological charts, Eastern Pacific.**—*C.E.P.B.*

BIOCLIMATOLOGY

9–138 551.586:612(02)

†Berg, Hellmut, **Wetter und Krankheiten.** [Weather and diseases.] Bonn, H. Bouvier, **1948.** 140 p. 48 figs., 153 refs. **DLC**—"Meteorotropic" diseases are defined and classified. Possible factors in their development are classified as: local (individual elements and complex), general weather situation, solar (radiation, sunspots, corpuscles, wave radiation), cosmic rays. Each of these is discussed and statistics (e.g. of passage of fronts) given for Germany. The statistical methods of investigation are set out. The method is mostly the variation on either side of a central day. No relation is found between diseases and individual elements. There is a slight but probably real relation to complex elements (föhn, passage of fronts). In Pt. C, statistics of nervous diseases, suicides and deaths are analyzed especially in relation to magnetically disturbed days and weather disturbances. Nervous diseases are found to increase about 2 days after appearance of a new sunspot. Pt E, deals briefly with "pathogenic weather situations and cosmic processes." All this is based on past statistics. In Pt. F, directed investigations are described. Theories of mechanism are discussed in Pt. G (electrical, chemical composition of air, rapid changes of pressure). Causation very complex. *Subject Headings:* **Bioclimatology, Medical meteorology, Textbooks.**—*C.E.P.B.*

9–139 551.586:616

Berg, Hellmut, **Kasuistik, Statistik und Experiment im medizinisch-meteorologischen Grenzgebiet.** [Case history, statistics and experiment in the realm of medical meteorology.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 2:27–32, **1950.** fig., 6 refs. **MH-BH**—A general discussion. The study of case histories is only useful when the effect of a given meteorological situation is expected and direct experiment is not practicable. Statistics survey "natural experiments" by means of correlation, e.g. coincidence of suicides with passage of fronts, but cannot give physical causes. Planned experiments can give valuable information but cannot replace statistical investigation of large numbers of cases. *Subject Heading* **Medical meteorology.**—*C.E.P.B*

9–140 551.586:615.8

Erichson, Kurt, **Hamburger Sozialfürsorge und Meeresheilkunde.** [Hamburg social welfare and maritime medical science.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 1:30–38, **1949. MH-BH**—Gives history of social welfare in Hamburg; first applied

to children in 1882. Some thousands now sent to seaside every year. Social welfare aims at providing favorable social surroundings. Roles of exercise and rest are discussed; only productive activities help. *Subject Headings:* **Climatotherapy, Hamburg, Germany.**—*C.E.P.B.*

9–141 551.586:612

†May, Jacques M., **Medical geography: its methods and objectives.** *Geographical Review*, 40(1):9–41, Jan. **1950.** table, 52 refs., section on *climate* p. 16–20. **DLC**—Among the climatic factors which are considered as having an influence on pathological factors (causes, hosts and man), are: latitude, rainfall, humidity, temperature, pressure, sunshine and cloudiness, wind velocity, radiation, static electricity and ionization. A correlation table on p. 36–38 gives the response (either +, −, or ?) of the various diseases, hosts and man (taken singly or in combination) to these climatic factors taken individually. A review of the climatic effects on disease, with numerous references to original works, is found on p. 16–20. Other geographical factors such as water, soil, culture and relief are discussed, followed by a treatment of individual diseases, emphasis on metabolism. *Subject Heading:* **Medical meteorology.**—*M.R.*

9–142 551.586:616:551.509.58

Kuhnke, Wolfgang and Zink, Otto, **Erfahrungen mit einer medizin-meteorologischen Vorhersage.** [Experiments with a medical meteorological forecast.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 2:11–26, **1950.** tables, 2 refs. **MH-BH**—The ideas of R. Schulze (*See item*, 9–45) were tried out by MANWD and a few Hamburg clinics. Forecasts included meteorological analyses and evaluation of medical effects of equivalent temperature, cooling power, etc., judged by their action on the vegetative nervous system. These are analyzed for nine groups of illnesses and tabulated under active cold air and warm air situations, oscillations or sudden changes, etc. In section 3 examples of forecasts are given and the possibility of prophylactic measures discussed. *Subject Heading:* **Medical meteorological forecasting.**—*C.E.P.B.*

9–143 551.586:61

Ragab, H. A., **Effect of humidities and temperatures on the size and number of oocysts of plasmodium gallinaceum transmitted by a mosquito.** *Nature, London*, 163(4147):643–644, April 23, **1949.** 2 tables, ref. **DLC**—Very low or high humidities are lethal to mosquitoes, but not necessarily to the malaria parasite in the mosquito. Rate of development of parasite affected by temperature, but not humidity. *Number* of oocysts decreased by low humidity. *Subject Headings:* **Medical meteorology, Malaria.**—*M.R.*

9–144 551.586:59

Ruttner, Friedrich, **Das Leben des Bienenvolkes im Spiegel der registrierenden Waage.** [The life of the bee community as shown by the registering scale.] *Wetter und Leben*, 2(9–10):211–214, March **1950.** **DWB**—Weight of a beehive and radiation income were continuously recorded on three July days. Some relation found to weather. *Subject Headings:* **Bioclimatology, Apiculture.**—*C.E.P.B.*

9–145 551.586:616:551.509.58

Schulze, Rudolf, **Über den Zusammenhang von Wetter und Krankheit. (Grundlagen der dynamischen Methode.)** [On the connection between weather and illness. (Basis of the dynamic method.)] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 2:1–10, **1950.** 7 refs. **MH-BH**—The inquiry is limited to aperiodic acute illnesses which are believed to be correlated with weather. Methods hitherto mainly statistical on past data; correlations have been found but a causal connection not yet proved and may be indirect. The investigations have mainly been limited to rare diseases and special meteorological conditions, e.g., fronts, but have given good results. Laboratory work is difficult; author considers mainly "dynamic" methods. Every change of weather is equivalent to a move to another climate and experiences of climatic physiology can be transferred to meteorological pathology. Meteorological, chemical and radiation (including electric and magnetic) factors are tabulated. These can be measured or forecast and author discusses possibility of daily medical weather

forecasts. [*See item* 9–142 (Kuhnke and Zink).] *Subject Heading:* **Medical meteorological forecasting.**—*C.E.P.B.*

9–146 551.586:612

†Spangenberg, W. W., **Meteorologische Beobachtungen an schwülen Tagen.** [Meteorological observations on sultry days.] *Zeitschrift für Meteorologie*, 4(1–2):8–16, Jan.–Feb. **1950.** 2 figs., 12 tables, 31 refs. **MH-BH**—Author took full meteorological and physiological observations on sultry-feeling days at Schwerin 1929–1949. Mean number 20 a year, April–Sept. No close connection with thunder. Tables and diagrams show relations to: humidity and temperature, cooling power, wind speed and direction, cloudiness and equivalent temperature. Sultriness appears to be associated with high temperature and relatively high humidity; equivalent temperature only to a limited extent. Ventilation is important; the effect of radiation is obscure. The feeling of sultriness is partly physical-psychological. *Subject Headings:* **Bioclimatology, Physiology.**—*C.E.P.B.*

9–147 551.582:63

†*Koloskov, Pavel Ivanovich, **Agroklimaticheskoe raïonirovanie Kazakhstana.** [Agroclimatic regionalization of Kazakhstan.] Moscow, Izdatel'stvo Akademii Nauk, SSSR, **1947.** 267 p. 59 tables, 212 refs., 45 equations. **DLC**—The work is divided into three main sections: (1) The physical basis of agroclimatological regionalization; (2) Bioclimatology and regionalization of crops; (3) Agroclimatic investigations into methods of agriculture.

In the first section the various meteorological or physical factors (radiation, temperature, humidity, soil moisture etc.) and the geographical factors which enter into the above (altitude, latitude, relief, pressure, wind, rainfall etc.) are considered quantitatively. Empirical formulas are worked out for calculating integrated indices of these factors, so as to create a rational classification on which to base climatic charts. Microclimatic factors are stressed. Data for 120 stations are used in computing indices.

The second section takes up each separate crop (wheat, oats, rice, corn, flax, tobacco, peas, beans, cotton etc.) and describes in detail the influence of the various physical factors and the basis for regionalization. Work of dozens of authors has been applied to the particular problems of Kazakhstan.

The third section deals with land usage and climatic amelioration, with many concrete examples of application of climatic regionalization in practice.

Pt. II (not available at present) is an **Atlas of Climatic and Agroclimatic Charts** of Kazakhstan.

A six-page bibliography lists 212 references on agricultural climatology, including 21 works by the author (1915–1940) on microclimate, frozen soil, forest influences, cartography and other phases of agricultural climatology, especially in the Far East of the U.S.S.R. *Subject Headings:* **Agricultural climatology, Climatic classification, Kazakhstan, U.S.S.R.**—*M.R.*

MISCELLANEOUS APPLICATIONS

VISIBILITY

9–148 551.591.3

*Berg, Hellmut, **Ergebnisse 25 jähriger Sichtbeobachtungen auf dem Königstuhl bei Heidelberg.** [The results of 25 years of visibility observations from the Königstuhl at Heidelberg.] *Reichsamt für Wetterdienst, wissenschaftliche Abhandlungen*, 5(5), Berlin, **1938.** 19 p. 6 figs., 10 tables, 10 refs. **DWB**—A model study of visibility, making use of remarkable series of observations from the Königstuhl near Heidelberg. From 1898 to 1923, Prof. Max Wolf made regular observations of 22 objectives (ranging from 0.6 to 98 km. distance and from 88 m. to 880 m. elevation). Some of these were industrial cities (Mannheim and Worms) while others were peaks. All are shown on a chart of the yearly mean percent visibility. Tables and graphs show the annual and diurnal variation in visibility of each objective, and the monthly frequency of various visibility ranges (by 10 km. intervals). Tables giving effect of wind direction, air mass and secular change over the 25-year period are presented and discussed. In general, poorest visibility occurred in winter and the best in June and August;

the best in summer in the afternoon and the best in winter in the morning; the best with east winds, except that visibility of the cities in the valley was best with a north wind. In the latter case there was a worsening of visibility from 1899 to 1906, after which no change was noted. *Subject Headings:* **Visibility variations, Rhine Valley, Germany.**—*M.R.*

OPTICAL PHENOMENA

9–149 551.593.54

Bullrich, Kurt, **Die Rolle der Dunst- und Eisteilchen in der Atmosphäre bei der Zerstreuung des Lichtes.** [The role of haze and ice particles in the atmosphere in the scattering of light.] *Deutscher Wetterdienst in der U. S. Zone, Berichte,* No. 12, p. 92–93, Bad Kissingen, **1950.** fig., 9 refs. **MH-BH**—Comparison of theoretical values of scatter function with those observed by several investigators shows very different results according to number, size and transparency of particles. Sometimes almost exclusively forward scattering, due to ice particles. *Subject Headings:* **Scattering, Haze, Ice particles.**—*C.E.P.B.*

9–150 551.593.63

Meyer, Rudolf, **Zur Theorie der Randbeugung in Eiswolken.** [On the theory of marginal refraction in ice clouds.] *Deutscher Wetterdienst in der U. S. Zone, Berichte,* No. 12, p. 182–184, Bad Kissingen, **1950.** 14 refs., 4 equations. **MH-BH**—The rapid decrease of light at the margin of the sun attributed to rare but large ice crystals is examined quantitatively in relation to a theory of Bullrich and Möller, which is confirmed. *Subject Headings:* **Refraction of light, Ice particles.**—*C.E.P.B.*

9–151 551.593.64

Rowe, T., **Lunar corona, North Atlantic Ocean.** *Marine Observer,* 20(149):148, July **1950.** fig. **MH-BH**—Sketch shows color sequence yellow, orange, purple, green, yellow, purple. *Subject Heading:* **Coronas.**

9–152 551.593.652:551.588.2

§Dieterichs, Heinz, **Zur Enstehung der Perlmutterwolken.** [On the origin of mother-of-pearl clouds.] *Deutscher Wetterdienst in der U. S. Zone, Berichte,* No. 12, p. 86–91, Bad Kissingen, **1950.** 5 figs. **MH-BH**—Iridescent stratosphere clouds at ca. 25 km. in South Norway occur mostly with depressions crossing Fennoscandia from NW, in North Scandinavia with depressions from west passing to north of Scandinavia. Typical charts given (Jan. 30, 1944, Feb. 18, 1938). Phenomenon due to lee waves behind coastal mountains on occasions of very cold stratosphere. *Subject Headings:* **Nacreous clouds, Topographic effects.**—*C.E.P.B.*

9–153 551.508.99 551.593.9

Maier, Wilhelm, **Das Phänomen der Sonnendoppelschatten.** [The phenomenon of double sun shadows.] *Zeitschrift für Meteorologie,* 4(1–2):16–21, Jan.–Feb. **1950.** 3 figs., 3 refs., equations. **MH-BH**—Author observed two shadows of a stick on white paper, one dark blue, the other bright yellow. He devised an instrument for making observations including photographic recording. The two shadows averaged 20° apart (37—7° decreasing with increasing sun height). The source of the dark shadow is the sun, that of the other is identified with the "bright spot" above the sun, explained as reflection from a high level atmospheric layer. *Subject Heading:* **Optical phenomena.**—*C.E.P.B.*

ATMOSPHERIC ELECTRICITY

9–154 551.594.2(02)

†Maurain, Charles Honoré, **La foudre.** [Lightning.] Paris, Librairie Armand Colin, **1948.** 215 p. 7 figs., numerous tables, 82 refs., equations. **DLC**—This book represents a systematic review of all of the aspects of thunderstorm electricity, based on literature published up to 1942. Many of the current theories (Simpson, Wilson, Ross Gunn and others) of lightning formation and on cloud physics, magnetic effects, luminosity, ball lightning, relation to solar activity, polarity of clouds, maintainance of earth's electric field (by lightning and rain),

vertical currents, ionization etc., are treated. Charges and discharges due to volcanic eruptions and sandstorms, atmospherics (sferics), acoustical effects etc. are also considered. An ample bibliography and index of authors cited, increase the value of the work as a reference book. *Subject Headings:* **Lightning, Thunderstorm electricity, Textbooks.**—*M.R.*

9–155 551.594.13

Israël, Hans, **Probleme und Aufgaben der Luftelektrizität.** [Problems and results of atmospheric electricity.] *Deutscher Wetterdienst in der U. S. Zone, Berichte,* No. 12, p. 75–77, Bad Kissingen, **1950.** 4 figs., 3 refs. **MH-BH**—Earth as a whole electrically neutral; distribution of + and − charges is explained by resistance of column between ionosphere and surface. *Subject Heading:* **Atmospheric electricity.**—*C.E.P.B.*

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON ICING

By: *Harris P. Kramer*

EXPLANATORY NOTE

Emphasis in this bibliography is placed on the meteorological and physical aspects of the formation of ice on aircraft. It has been impossible to include references to all the vast amount of material published on various phases of aircraft icing, and on the instruments and research programs used in the study of this phenomenon.

In the selection of items for publication, technological studies have been omitted, except in cases where meteorological data are included along with treatment of the more technical and mechanical aspects. The Subject Heading, **Icing prevention,** will indicate such application to de-icing techniques. Articles applying to ice accretion on particular parts of aircraft are indexed in the Subject Outline under **Technological Aspects** of Icing of Aircraft.

A few representative works on rime have been included, particularly good data sources and observations made at mountain stations. A few references to the phenomenon of glaze, or glazed frost have been included as related material. Also some classical works on such aspects of cloud physics as freezing of supercooled water, liquid water content of clouds, drop size distribution, condensation nuclei, etc., are included for their significance in the study of the physics of ice accretion. The Subject Heading, **Ice formation,** indicates studies dealing with the pure physics of this phenomenon. The Subject Heading, **Aviation,** is added when works are directly applicable to planning of air routes, pilots' procedures, aircraft performance, etc., under icing conditions.

Entries are arranged chronologically by year and alphabetically within each year.

Acknowledgments. The cooperation of Dr. Wallace E. Howell and his staff at the Geographical Institute, Harvard University, has been invaluable in permitting our use of the Mount Washington Observatory Library collection of material on icing.

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BIBLIOGRAPHY ON ICING

1901–1929

I–1 551.576

†Conrad, Victor, **Der Wassergehalt der Wolken.** [The water content of clouds.] *K. Akademie der Wissenschaften, math.-naturwis. Klasse, Denkschriften,* 73, **1901.** 17 p. 5 figs., tables, refs., equations. (Reprint available.) Mt. Washington Observatory Library.—Review of early work from 1851 on. Report of various laboratory research projects, as well as reports from research on natural clouds at mountain stations: Schneeberg, Schafberg, Sonnblick. (*See item* I–109.) *Subject Heading:* **Water content of clouds.**

I–2 551.574.7

Peppler, W., **Reif- und Eisbildung in der freien Atmosphäre.** [Formation of rime and ice in the free atmosphere.] *Beiträge zur Physik der freien Atmosphäre,* 10:38–50, **1922–1923.** tables, refs. **DLC**—Discussion of the role of sublimation and supercooled water droplets in rime formation. Study of icing processes by kite flight recommended. *Subject Headings:* **Ice formation, Rime.**

I–3 551.574.4(47)

Lir, E. S., **Sinopticheskie usloviia gololeda v Evropeiskoi chasti SSSR.** [Synoptic conditions for glazed frost in the European part of the U.S.S.R.] *Zhurnal Geofiziki i Meteorologii,* 4:23–38, **1927.** 11 charts, ref. Summary in English. **DLC**—Glazed frost is defined as supercooled drops of rain freezing upon reaching the earth and causing a coating of ice. Synoptic examination indicates

that it usually occurs on the boundaries separating an anticyclone and a region of depression. Two types of glazed frost are named, east type and west type, each of which corresponds to the distribution of baric centers over Europe and western Siberia. Charts indicate the localities of some of the baric centers. *Subject Headings:* **Glaze, U.S.S.R.**

I–4 551.576.1

†Köhler, Hilding, **On water in the clouds.** *Geofysiske Publikasjoner*, 5, No. 1, **1928.** 16 p. 9 figs., 5 tables, 17 refs., equations. **DWB**—Report of measurement of water content of clouds at Haldde and comparison with similar works of Conrad and Wagner in Austria. Relation established between drop size and water content and between visibility and water content. *Subject Headings:* **Water content of clouds, Drop size distribution.**

I–5 551.574.7

U. S. National Advisory Committee for Aeronautics, **Ice formation on wings and other structural parts of aircraft.** *Preliminary Report*, Washington, D. C., March **1928.** 56 p. photo. **DWB**—One of earliest reports of interest in practical research in icing. Includes questions and correspondence in regard to the setting up of an icing research program, as well as some of the early observations by pilots from various regions of the U. S. *Subject Headings:* **Icing research, Icing of aircraft.**

I–6 551.574.1:532.77

Al'tberg, V. IA., **O tsentrakh kristallizatsii vody.** [Regarding the centers of crystallization of water.] *Glavnaia Geofizicheskaia Observatoriia, Izvestiia*, No. 2:3–10, **1929.** 8 figs. Summary in English. **DLC**—Laboratory investigation of freezing nuclei in water is reported. Characteristics of formation and development of the centers of crystallization of water are considered with regard to the degree of supercooling and other controlled temperature conditions. *Subject Heading:* **Freezing nuclei.**

I–7 551.574.7

Carroll, Thomas and McAvoy, William H., **The formation of ice upon airplanes in flight.** *U. S. N.A.C.A. Technical Note*, No. 313, Aug. **1929.** 13 p. 9 figs. **DLC**—Some of earliest constructive American work on icing problem. Atmospheric conditions studied under which icing of aircraft occurs in flight. Different formations due to different conditions, as well as preventative measures are described. *Subject Headings:* **Icing of aircraft.**

I–8 551.574.7

Kopp, W., **Danger of ice formation on airplanes.** *U. S. N.A.C.A. Technical Memorandum*, No. 499, Washington, D. C., **1929.** 14 p. fig., tables. **DWB**—Translation from *Deutsches Flugwetterdienst Erfahrungsberichte.* Data collected by Peppler at Lindenberg with kites are used in discussion of various types and causes of ice formation on aircraft. *Subject Headings:* **Icing of aircraft.**

1930–1934

I–9 551.574.7

Andrus, C. G., **Meteorological notes on the formation of ice on aircraft.** *Monthly Weather Review*, 58:22–24, **1930.** **DWB**—General discussion of conditions for icing, stating examples, icing problems for aircraft, and some brief regional analyses. No data tabulated. *Subject Heading:* **Icing of aircraft.**

I–10 551.574.7

Geer, William C. and Scott, Merit, **The prevention of the ice hazard on airplanes.** *U. S. N.A.C.A. Technical Note*, No. 345, July **1930.** 23 p. 11 figs., 4 refs. **DWB**—The physical phenomena of icing are reviewed and experimental apparatus for observation of the formation and adhesion of ice upon small airfoils described. Most of the article discusses possible means of preventing ice: chemical, mechanical, etc. *Subject Headings:* **Icing of aircraft, Icing prevention.**

I–11 551.574.7

Humphreys, W. J., **Supersaturation and icing of airplanes.** *Monthly Weather Review*, 58:245-246, **1930.** **MH-BH**—Brief article disputing the condensation explanation of rapid airplane icing. *Subject Heading:* **Icing of aircraft.**

I–12 551.574.7

Wegener, Kurt, **Die Vereisung von Luftfahrzeugen.** [Icing of aircraft.] *Meteorologische Zeitschrift*, 47:145–147, April **1930.** **DWB**—Brief general article describing various types of icing and accompanying meteorological conditions. No data or illustrations. *Subject Heading:* **Icing of aircraft.**

I–13 551.574.7

†Bleeker, W., **Einige Bemerkungen über Eisansatz an Flugzeugen.** [Some remarks on icing deposits on aircraft.] *Meteorologische Zeitschrift*, 49:349–354, Sept. **1932.** 2 figs., numerous refs., 7 equations. **MH-BH**—Translation by J. Vanier, *U. S. N.A.C.A. Technical Memorandum*, No. 1027, Aug. **1942.** 11 p. 2 figs., 16 refs., equations. **DLC**—Good theoretical article discussing phenomena of icing with consideration of and reference to other work in field. Concluded that the "interception" of the droplets rather than sublimation plays the more important role in ice accretion. *Subject Heading:* **Icing of aircraft.**

I–14 551.574.7

Robitzsch, M., **The icing of aircraft.** *U. S. N.A.C.A. Technical Memorandum*, No. 1028, Sept. **1942.** 8 p. fig., 2 refs., numerous equations. Translated by J. Vanier. **DWB**—Original: **Über die Vereisung von Luftfahrzeugen.** *Beiträge zur Physik der freien Atmosphäre*, 18:235–241, **1932.**—Processes accompanying icing on solid bodies are analyzed theoretically, and the effect of each weighed against the total effect. *Subject Heading:* **Icing of aircraft.**

I–15 551.574.7

†*Samuels, L. T., **Meteorological conditions during the formation of ice on aircraft.** *U. S. N.A.C.A. Technical Note*, No. 439, **1932.** 20 p. 5 figs., 4 tables, 28 refs. **DLC**—Important early work. Results of a number of records secured from autographic meteorological instruments mounted on airplanes during icing conditions. Good bibliography of early work in icing research. *Subject Heading:* **Icing of aircraft.**

I–16 551.574.7:551.509

†§Schinze, Gerhart, **Die Bedeutung der aerologisch-synoptischen Luftmassenanalyse zum Erkennen gefährlicher Flugzeugvereisung.** [The importance of synoptic-aerological airmass analysis for recognition of hazardous icing conditions.] *Zeitschrift für angewandte Meteorologie*, 49:107–115, **1932.** figs., table, numerous refs. **DWB**—Study of synoptic and aerological conditions for icing. References to some of earliest research in technical and physical problems of aircraft icing. *Subject Headings:* **Icing of aircraft, Synoptic-aerological studies.**

I–17 551.574.42(479)

§Dezhordzhio, Viktor, **Gololed 13–15 dekabria 1930 g.v Krasnodarskom zheleznodorozhnom raïone.** [Glazed frost on Dec. 13–15, 1930, in the district of the Krasnodarsky railroad.] *Zhurnal Geofiziki*, 3, No. 3(9):312–325, **1933.** 13 figs., 3 tables, refs. Summary in French. **DLC**—Detailed synoptic analysis given of a typical case of glaze icing in the northern Caucasus region. Graphs and tables represent temperature, humidity, precipitation, upper air, etc., conditions. The invasion of the Arctic air mass which caused the icing is traced and analyzed. *Subject Headings:* **Glaze, Caucasus, U.S.S.R.**

1935–1937

I–18 551.508.7:551.574.7

Böttger, R., **Untersuchungen über die Eignung von Scheibe und Kegel zur Messung des Eisbelages mittels des aerodynamischen Widerstandes.** [Suitability of disc and cone for ice layer measuring by aerodynamic drag.] Original: *Deutsche Versuchsanstalt für Luftfahrt*, FB 462, Sept. 2, **1935.** 12 p. 7 figs. Translated by O. W. Leibiger. *U. S. Air Force Translation Report* No. F-TS-767-RE, Aug. 1946. 11 p. 7 figs., table. **DLC**—Requirements concerning Pitot tubes of a rotary wing icing meter are compiled and the behavior of two suitable types is tested in the wind tunnel during icing conditions. *Subject Heading:* **Icing meters.**

I–19 551.574.7

*§McNeal, Don, **Ice formation in the atmosphere.** California Institute of Technology, Meteorological Department, Pasadena, May **1935.** 28 p. 17 figs., table, 12 refs. **DWB**—Also *Journal of the Aeronautical Sciences*, 4:117–123, Jan. 1937. fig., table, 10 refs. **DLC**—Review in *American Meteorological Society, Bulletin*, 19:381–383, Nov. 1938. Question of icing approached from point of view of Köhler's work on condensation. The fundamental phenomena involved are listed and discussed in order: 1) the condensation of water vapor in the atmosphere; 2) existence of undercooled water in the atmosphere; 3) the freezing of undercooled droplets. Processes involved in the freezing of undercooled water on aircraft are then taken up. Report given of some observational material collected by author. *Subject Headings:* **Icing of aircraft, Ice formation, Supercooled water.**

I–20 551.574.7

*§Mironovitch, V. and Viaut, A., **Du risque de givrage en fonction des types de temps.** [The risk of icing as a function of weather type.] *La Météorologie*, 11:498–503, **1935.** 5 charts. **DWB**—

Observations of "icing" on 48 aerologic missions are tabulated according to the general synoptic situation. Conclusions drawn as to most dangerous conditions for icing. *Subject Headings:* **Icing of aircraft, France.**

I–21 551.574.7

§Noth, H. and Polte, W., **Über die Vereisung von Luftfahrzeugen.** [Formation of ice on aircraft.] *Luftwissen*, 2:304–311, **1935. DLC**—Translation: *Royal Aeronautical Society, Journal*, 41:595–608, July 1937. 9 figs. **DLC**—Refers to meteorological conditions favorable for icing, particularly in Europe. Processes and types of ice formation and effects on various parts of plane are discussed. Weather conditions for ice formation are analyzed and synoptic charts given. Means for prevention of ice accretion, such as horizontal navigation, vertical navigation and technical remedies suggested, as well as procedure in case of ice accretion. *Subject Headings:* **Icing of aircraft, Aviation, Icing prevention.**

I–22 551.574.42

†*§Prestin, Heinz, **Nebelfrostablagerungen auf europäischen Bergen.** [Rime deposits on European mountains.] Friedrich Wilhelms-Universität, Berlin, Inaugural-Dissertation, Wilh. Postberg, Bottroplw. **1935.** 100 p. 40 figs., 23 tables, 42 refs. **MH-BH**—Structure and formation of hoar frost and rime, dependence of rime deposits on meteorological factors such as temperature, wind and fog, and distribution of rime on the earth are discussed. Outline of research projects and various locations of mountain summits given. Increase of rime with height noted. *Subject Headings:* **Rime, Europe.**

I–23 551.574.7

Reinbold, O., **Beiträge zum Vereisungsproblem der Luftfahrt.** [Contributions to aircraft icing problems.] *Meteorologische Zeitschrift*, 52:49–54, Feb. **1935.** 4 figs., 3 tables, 9 refs., equation. **MH-BH**—Analytical article discusses problem of aircraft icing from synoptic aerological point of view. *Subject Headings:* **Icing of aircraft, Synoptic-aerological studies.**

I–24 551.574.7(79)

§Riley, John A., **The Sierra Nevada icing zone.** [1936.] 5 p. 3 figs. (Mimeographed.) **MH-BH**—Attempt made to explain airline pilots' avoiding a frequent icing hazard in this region yet maintaining regular schedules and operating safely. *Subject Headings:* **Icing of aircraft, Sierra Nevada Mountains.**

I–25 551.574.7(41)

*§Bigg, W. H., **Ice formation in clouds in Great Britain.** *Meteorological Office, Professional Notes*, No. 81, **1937.** 35 p. 4 figs., 8 tables, 14 refs., equations. **MH-BH**—Discussion of physical processes and weather conditions and types of ice formation. Statistics of ice formation reports in Great Britain. Valuable discussion of individual cases, illustrated by two synoptic charts and upper air diagrams. *Subject Headings:* **Icing of aircraft, Great Britain.**

I–26 551.574.7

Clouston, A. E., **Report on icing of D.H. Comet G-ACSS during London–Cape–London flight, 13.11.37–20.11.37.** Typescript, **1937.** 10 p. **Great Britain Meteorological Office Library.**—Unchecked. *Subject Headings:* **Icing of aircraft, Great Britain, Capetown, South Africa.**

I–27 551.574.42(437)

†Hrudička, Bohuslav, **Zur Nebelfrostfrage.** [Questions on rime.] *Beiträge zur Geophysik*, 51:335–342, **1937.** 3 figs., numerous refs., equation. **DLC**—A general review of contemporary works on rime deposits and icing from Czechoslovakia. *Subject Headings:* **Rime, Ice formation, Czechoslovakia.**

I–28 551.574.42:551.574.7

Pagliuca, S., **Icing measurements on Mount Washington.** *Journal of the Aeronautical Sciences*, 4:399–402, **1937.** 6 figs., table, 2 refs. **DLC**—Paper discusses experimental methods used on Mount Washington for measurement of rime deposition and possible application of these methods for study of icing on aircraft. Table includes results of rime deposition test on Mt. Washington. *Subject Headings:* **Rime, Icing meters, Mount Washington Observatory.**

I–29 629.13(261):551.574.7

Parkin, J. H., **North Atlantic air service. The ice hazard,** Appendix XII, p. 655. *Engineering Journal, Montreal*, 20:611–647, **1937.** 24 figs., 8 tables. **DLC**—Extensive article on trans-Atlantic flight problems, routes, meteorological conditions, including some rather brief consideration of icing.

Excellent survey however, of North Atlantic air conditions in general. Appendix XII considers types of icing, meteorological and physical conditions and effects of icing on aircraft. *Subject Headings:* **Aviation, North Atlantic Ocean, Icing of aircraft.**

I–30 551.574.7(78)(79)

Riley, J. A., **Aircraft icing zones on the Oakland-Cheyenne Airway.** *Monthly Weather Review*, 65:104–108, **1937.** 4 figs., 9 refs. **MH-BH**—Author found heaviest icing to occur in zones over the crest of the ranges at levels about at the top of the updrafts over the mountains. Rime was formed at higher levels and glaze in the lower. Figures show cross sections of air masses, meteorological conditions, and where icing may be expected. *Subject Headings:* **Icing of aircraft, Rocky Mountains.**

I–31 551.574.

Speranza, F., **Le formazioni di ghiaccio.** [The formation of ice.] *Rivista di Meteorologia Aeronautica*, 1(2):19–30, **1937.** 6 figs., 6 refs., equations. **DLC**—Physical and meteorological aspects are considered. Causes given of two fundamental types of icing. Frontal conditions are analyzed. Consideration given to occlusions, temperature, cloud types, visibility, humidity, orographic influences, wind and turbulence. *Subject Heading:* **Icing of aircraft.**

I–32 551.574.7(43)(47)

*Wörner, H., **Versuch einer Statistik der Vereisungswetterlagen auf den Flugstrecken Königsberg–Berlin und Königsberg–Moskau.** [Research on the statistics of weather conditions for ice formation on the air routes, Königsberg to Berlin and Königsberg to Moscow.] *Deutsches Flugwetterdienst, Erfahrungsberichte*, 9(28):181–194, **1937.** (Unchecked.)—*Subject Headings:* **Icing of aircraft, Königsberg, Berlin, Germany, Moscow, U.S.S.R.**

1938

I–33 551.574.

Arenberg, D., **The triple point of water and the icing of airplanes.** *American Meteorological Society, Bulletin*, 19:383–384, **1938.** 2 refs. **DWB**—Brief theoretical article on the possibility of extreme rates of ice formation's occurring at the triple point of water. *Subject Headings:* **Icing of aircraft, Ice formation.**

I–34 551.574.

Dentan, J., **La formation de la glace sur les aéronefs.** [The formation of ice on aircraft.] *L'Aeronautique*, 20:183–193, 207–220, Sept., Oct. **1938.** 23 figs., refs., equations. **DLC**—Abstract in: *Journal of the Aeronautical Sciences*, 6:123, 1939. Sections consider atmospheric conditions for formation of ice, physical aspects of the problem of icing, different types of icing and mechanics of their formation, speed and effects of ice formations, and various means of protection against icing. *Subject Headings:* **Icing of aircraft, Icing prevention.**

I–35 551.574.

Findeisen, W., **Meteorologisch-physikalische Vorbedingungen der Vereisung in der Atmosphäre.** [Meteorological and physical limitations of icing in the atmosphere.] *Jahrbuch der deutschen Luftfahrtforschung Ergänzungsband*, p. 102–105, **1938.** 8 figs. **DLC**—Translation: *U. S. N.A.C.A. Technical Memorandum*, No. 885, 1939. 7 p. 8 figs. **DLC**—Model of icing zones in a warm-front cloud system representing typical composition of precipitating stratiform clouds is suggested. Progress is reported in cloud research, results of which will enable more accurate forecasting of the zones of icing hazards by ascertaining at any time the distribution of water clouds and ice clouds above the zero degree boundary. *Subject Headings:* **Icing of aircraft, Cloud physics, Icing forecasting.**

I–36 551.574.

French Committee for the Study of Ice Formation, **Report of ice formation on aircraft.** *U. S. N.A.C.A. Technical Memorandum*, No. 919, **1938.** 20 p. **DLC**—Translated by J. Vanier, from **Rapport du 19 mai 1938, du Comité d'Étude du Givrage.** *Bulletin des Services Techniques*, No. 85, Publications Scientifiques et Techniques du Ministère de l'Air.—General meteorological and physical conditions for icing are reviewed. Carburetor icing is discussed in particular and the various means of combatting icing are briefly described. *Subject Heading:* **Icing of aircraft.**

I–37 551.574.7:551.558.1(794)

Hallanger, N. L., **A study of aircraft icing.** *American Meteorological Society, Bulletin*, 19:377–381, **1938.** 4 refs. **DWB**—Information on icing, temperature, turbulence, etc., obtained from pilots' flying in and out of Oakland, analyzed. Table shows relation of type of ice to temperature although temperature is called not the controlling factor; rather the existence of vertical motion

plays the primary role in icing on aircraft in this region. All factors influencing vertical velocities must be considered for good forecasting. *Subject Headings:* **Icing of aircraft, Vertical motion. California.**

I–38 551.508.765

Houghton, H. G. and Radford, W. H., **On the measurement of drop size and liquid water content in fogs and clouds.** *Papers in Physical Oceanography and Meteorology*, (Woods Hole and Massachusetts Institute of Technology), Vol. 6, No. 4, **1938. MH-BH—I. Microscopic measurement of the size of natural fog particles.** p. 3–15. 9 figs., 21 refs. Method of measurement of fog particle size is described and considered entirely reliable. System for determining number of fog drops in a unit of air included. **Part II. An instrument for sampling and measuring liquid fog water.** p. 19–31. 9 figs., table, 6 refs. Usefulness of fog water data is indicated and methods of procuring are reviewed. Investigation of sampling problem in operation of fog measuring instruments described. Constructional and operational features of a new fog water instrument discussed. *Subject Headings:* **Cloud meters, Water content in clouds, Fog.**

I–39 551.574.7:551.508.822

Lange, Karl O., **The application of the Harvard radio meteorograph to a study of icing conditions.** *Journal of the Aeronautical Sciences*, 6:59–63, **1938.** 6 figs., 8 refs., equation. **DLC**—Ascensional rate of radio sounding balloons affected by icing. From changes of rate of ascension amount of ice formation can be computed and conditions in the atmosphere indicated. Plan of Blue Hill Observatory for study of mechanics of ice formation by systematic radio sounding is given. *Subject Headings:* **Icing of aircraft, Icing research, Radiosonde ascents.**

I–40 551.574.7:551.509

Minser, Edward J., **Studies of synoptic free-air conditions for icing of a rcraft.** *American Meteorological Society, Bulletin*, 19:111–122, **1938.** 9 figs. **DLC**—Careful analysis given of synoptic conditions in which ice formation is usually encountered or where the occurrence is of puzzling nature or in a manner contrary to previous information or deduction. Points are well-illustrated by graphs showing cross sections of the atmosphere during conditions favorable for icing. *Subject Headings:* **Icing of aircraft, Icing forecasting.**

I–41 551.574.7

Ritz, L., **Vereisung.** [Ice formation.] *Jahrbuch der deutschen Luftfahrtforschung Ergänzungsband*, p. 106–111, **1938.** 25 figs., equations. **DLC**—Discusses the effect of ice formation on wings of an aircraft, as deduced from laboratory experiments. The many illustrations include a series of cinephotos of icing cases. *Subject Heading:* **Icing of aircraft.**

I–42 551.574.7

§Rossi, Veikko, **Glatteisbildung und Vereisung bei Flugzeugen.** [Glazing and icing of aircraft.] *Zeitschrift für angewandte Meteorologie*, 55:48–51, **1938.** fig., 2 charts, 6 refs. **DWB**—Synoptic aerological conditions for icing briefly discussed. *Subject Heading:* **Icing of aircraft.**

I–43 551.574.7(4)

§Scherhag, R., Wetterskizzen, Nr. 38: **Vereisung durch Luftmassenumwandlung.** [Weather sketches, no. 38: icing as a result of air mass changes.] *Annalen der Hydrographie und maritimen Meteorologie*, 66:257–259, **1938.** 2 figs. **DLC**—Brief synoptic aerological analysis of icing conditions on Jan. 25, 1938, over northwestern Europe. *Subject Headings:* **Icing of aircraft, Air masses, Northwest Europe.**

I–44 551.574.7

Stickley, A. R., **Some remarks on the physical aspects of the aircraft icing problem.** *Journal of the Aeronautical Sciences*, 5:442–446, **1938.** 5 figs., table, 12 refs., 7 equations. **DLC**—Some of theoretical work on physical aspects of aircraft icing surveyed and conclusions drawn as to droplet size, conditions of supercooling, role of conduction and evaporation, "icing time" and shapes of ice deposits, freezing point and presence of salt nuclei. *Subject Headings:* **Icing of aircraft, Ice formation.**

1939

I–45 551.574.7:551.594

Barakan, N. B., **Ob odnoi vozmozhnoi prichine obledeneniia vosdushnykh sudov.** [A possible cause of the icing of airships.] *Meteorologiia i Gidrclogiia*, No. 10–11:188–192, Oct.–Nov. **1939.** 2 figs., 5 refs. **DLC**—Discussion of the part played by electrical phenomena in the atmosphere in ice formation on aircraft. *Subject Headings:* **Icing of aircraft, Atmospheric electricity.**

I–46 551.574.

Eredia, F., **Le formazioni di ghiaccio sugli aeroplane.** [The formation of ice on airplanes. *Rivista di Meteorologia Aeronautica*, 3(2):46–83, **1939.** 25 figs., tables, equations. **DLC**—Well illustrated general review of meteorological conditions for icing of aircraft along with some of the technical problems, based on research and data of other workers in the field. *Subject Heading:* **Icing of aircraft.**

I–47 551.574.

†Geer, William C., **An analysis of the problem of ice on airplanes.** *Journal of the Aeronautical Sciences*, 6:451–459, **1939.** 71 refs. **DLC**—Most important physical conditions of atmospheric ice in relation to airplanes listed, along with discussion of parts affected and engineering principles to be considered. *Subject Heading:* **Icing of aircraft.**

I–48 551.574.

Guiraud, M., **Le givre.** [Icing.] France. Office National Météorologique, March **1939.** 43 p. refs. **DWB**—Author gives a general description of the nature and consequences of icing; he outlines various methods of studying the icing problem, along with consideration of meteorological factors involved, such as temperature, humidity, liquid water content and drop sizes. Some actual cases of icing are taken up, and methods of protection against icing are discussed: thermal, mechanical, chemical, and meteorological. *Subject Headings:* **Icing of aircraft, Icing prevention.**

I–49 551.574.

Lebedev, N. V., **Combatting ice on aircraft.** (Russian.) Moscow-Leningrad, **1939.** Extract: **The processes of ice formation on aircraft and methods of their investigation.** Translation by V. P. Akimoff, of chap. 1–5, p. 7–77. M.A.P., R.T.P. Translation No. 1523. 47 p. Available: Great Britain. Meteorological Office Library; or: Institute of Aeronautical Sciences, 2 East 64th St., N. Y. C., N. Y. (Unchecked)—Includes chapters on: (1) meteorological conditions and different kinds of ice formation; (2) effects of various factors; (3) nature of ice on different parts of the aircraft; (4) experimental methods for the examination of ice formations; (5) passive method of ice prevention on aircraft. The third chapter includes section on temperature, humidity, cloud types and height, climatic and local conditions, speed of aircraft, etc. *Subject Heading:* **Icing of aircraft.**

I–50 551.574.42:06(47

Minos'ian, V., **O sluzhbe gololeda.** [The glazed frost service.] *Meteorologiia i Gidrologiia*, No. 7–8:184–185, **1939.** **DLC**—Projected work of the glazed frost investigation program in U.S.S.R. briefly described. *Subject Headings:* **Glaze, Meteorological services, U.S.S.R.**

I–51 551.574.7:629.1

Simpson, G. C., **Ice accretion on aircraft; notes for pilots.** Rev. 1939. London, H. M. Stationery Office, **1939.** 15 p. table. (*Great Britain. Meteorological Office, Professional Notes*, 6, No. 82.) At head of title: M.O. 420b. **MH-BH**—Excerpts in: *American Meteorological Society, Bulletin* 19:326–329, 1938. Simple explanation of icing from pilots' point of view, including physical and meteorological aspects. *Subject Headings:* **Icing of aircraft, Aviation.**

I–52 551.574.42:06(47

Skobtsev, K. A., **Sostoianie i perspectivy rasvitiia gololednoi sluzhby.** [State and perspective of the development of the glazed frost service.] *Meteorologiia i Gidrologiia*, No. 7–8:169–172, **1939.** map, 2 tables. **DLC**—Problems, investigation and damage of glazed frost reviewed. A plan for an observational network of 133 stations to investigate problem is given. *Subject Headings:* **Glaze, Meteorological services, U.S.S.R.**

I–53 551.574.42:551.553(477

†Turoverov, K. S., **K voprosu analiza sushchestvuiushchikh sposobov vychisleniia gololednych i vetrovykh nagruzok.** [On the problem of analyzing present methods of computation of glaze and wind loadings.] *Meteorologiia i Gidrologiia*, No. 7–8:55+, **1939.** 2 figs., 7 tables, 41 refs. **DLC**—Author considers the problem of glaze in relation to wind, using observations from the southeastern part of European SSSR and concludes that heavy loadings of glaze are usually accompanied by high wind speed. Some characteristics of the synoptic conditions accompanying such glaze formation are given. *Subject Headings:* **Glaze, Wind variations, U.S.S.R.**

I–54 532.7

†Veinberg, B. P., **O stepeni sootvetstviia opytnym dannym vzgliadov Prof. V.IA. Al'tberga na protsessy kristallizatsii periokhlazhdennoi vody.** [On the degree of correspondence between this experimental data and the view point of Prof. Al'tberg on the crystallization processes of super

cooled water.] *Meteorologiia i Gidrologiia*, No. 9:3–20, 1939. 31 refs. **DLC**—Detailed analysis of Al'tberg's conclusions from his six years of work on crystallization. *Subject Headings:* **Supercooled water, Ice formation.**

I–55 551.574.7

§Viaut, A., **Étude sur le givrage.** [Study on ice formation.] *La Météorologie*, 3 Ser., p. 159–186, 1939. 23 figs. **DWB**—Extensive investigation made of general and local meteorological conditions which cause icing and of methods of avoiding or minimizing the effects of icing. Synoptic aerological analyses are made of several specific examples. *Subject Heading:* **Icing of aircraft.**

1940

I–56 551.574.7:551.511:551.509

Epperly, Perry O., **Instability and moisture content as factors in ice accretion on aircraft in flight and a practical chart for use in forecasting icing areas.** U. S. Weather Bureau, Airport Station, Salt Lake City, Utah, April 1940. (Unchecked)—*Subject Headings:* **Icing of aircraft, Instability, Icing forecasting.**

I–57 551.524.7:551.574.7

Eredia, Filippo, **L'isoterma zero a quota.** [Role of the zero isotherm.] *Rivista Aeronautica*, 16(10):15–23, Oct. 1940. 6 figs., 2 refs. **DLC**—Relation of 0° isotherm to zone of greatest icing danger in the free atmosphere (fractocumulus, cumulonimbus, etc.); processes of rain formation associated with icing layer; method of automatically warning pilot of the icing danger zone, and other problems of cloud physics discussed and illustrated by adiabatic diagrams, photos, etc. *Subject Headings:* **Zero isotherm, Icing of aircraft.**—*M.R.*

I–58 551.574.7

†Golovkov, M. P., **O nekotorykh svoistavakh l'da, obrazuiushchegosia pri obledenenii samoleta.** [Investigation of ice formed on airplanes.] *Akademiia Nauk, SSSR, Isvestiia, Ser. Geogr. i Geofiz.*, No. 1:119–134, 1940. 2 figs., table, 14 refs. Summary in English. **DLC**—Characteristics of ice formed on airplanes are examined, and it is found that the ice consists of subhedral crystals and has an aphanatic texture and radial structure. The presence of foreign matter causes a higher specific gravity. Durability of the ice cover on the plane depends on changes of temperature. *Subject Headings:* **Icing of aircraft, Ice formation.**

I–59 551.574.7(94)

§Hogan, J., **Ice accretion on aircraft in Australia.** Australia. *Bureau of Meteorology, Bulletin*, No. 26, Melbourne, 1940. 48 p. numerous synoptic charts, tables, refs. **DWB**—Thorough synoptic analyses of conditions for formation of ice on aircraft are given for various sections of Australia. *Subject Headings:* **Icing of aircraft, Australia.**

I–60 629.13:551.574.7(481)

*Jelinek, Alfred, **Die flugklimatologischen Verhältnisse der Flugstrecken Norwegens.** [Climatological conditions for flying along Norwegian air routes.] *Germany, Reichsamt für Wetterdienst, Forschungs- und Erfahrungsberichte, Ser. A.*, No. 2, 1940. 18 p. 11 figs., 4 charts, 18 tables. **DWB**—Icing considered among other weather conditions for the various parts of Norway. *Subject Headings:* **Icing of aircraft, Aviation, Norway.**

I–61 551.574.7

Kantrowitz, Arthur, **Aerodynamic heating and the deflection of drops by an obstacle in an airstream in relation to aircraft icing.** *U. S. N.A.C.A. Technical Note*, No. 779, 1940. 9 p. 6 figs., 6 refs., 8 equations. **DLC**—Deals with development of theory of cloud-droplet interception by airfoils from which quantitative impingement rates and area of catch for particular conditions may be calculated. Surfaces moving through air at high speed are shown, theoretically and experimentally, to be subject to important aerodynamic heating effects that will materially reduce the heat required to prevent ice. *Subject Headings:* **Icing of aircraft, Icing prevention.**

I–62 551.574.7

Lacey, J. K., **A study of meteorological and physical factors affecting the formation of ice on airplanes.** *American Meteorological Society, Bulletin*, 21:357–367, Nov. 1940, 4 figs., 3 tables, 23 equations. **DWB**—Theoretical relation derived between number of cloud droplets per unit volume, the prevailing drop size, and the amount of ice deposited per unit cross section area of collecting object. Statistical relation established between the stability of cloud layers and the occurrence of ice formation. *Subject Heading:* **Icing of aircraft.**

I–63 551.574.7:551.57

*Peppler, Wilhelm, **Unterkühlte Wasserwolken und Eiswolken.** [Supercooled water and ic clouds.] *Germany, Reichsamt für Wetterdienst, Forschungs- und Erfahrungsberichte, Ser. B,* No. 1 Berlin, **1940.** (Originally secret.) 68 p. 12 figs., 67 tables, 8 refs. **DWB**—A comprehensive an detailed analysis of 823 cases of icing reported during 9110 airplane ascents made at Munich, Darm stadt, Hamburg, Berlin, Königsberg and Köln from 1931 through 1935. Frequency of icing wit variation in height, region, season, various cloud forms, snow, rain, heavy rain, drizzle, weathe type, etc. Temperature at lower and upper border of icing zone and of cloud itself given in con tingency tables and graphs. Light and heavy icing differentiated. Icing occurred in 9% of al flights. In 75% of cases with icing there was no precipitation, 16% with rain, 8% snow, and 2% graupel; with heavy icing 21% had rain, 2% snow, and 1% graupel. Stratus clouds comprised 36% of all icing cases and 29% of all cases with heavy icing. The low frequency of Cu with icing (5% was attributed to the pilot's being able to avoid them more easily than St, Nb, or Sc. Icing occurre most often in the south quadrant of a low (22%). *Subject Headings:* **Icing of aircraft, Cloud physics Supercooled water, Germany.**—*M.R.*

I–64 551.574.1 551.574.

Speranza, Francesco, **Nuclei di condensazione e soprassaturazione umidità relativa specific e depositi di ghiaccio al carburatore dei velivoli.** [Nuclei of condensation and supersaturation— relative specific humidity and deposits of ice on airplane carburetors.] *Rivista di Meteorologia Aero nautica,* 4(2):38–47, **1940.** 2 figs., 3 equations. **DLC**—Theory and application of tables of wate content of supersaturated air at various temperatures to problems of carburetor icing. *Subjec Headings:* **Icing of aircraft, Condensation nuclei.**—*M.R.*

I–65 551.574.

*Vorontsov, P. A., **Aerologicheskie usloviia obledeneniia samoletov.** [Aerological conditions o ice formation on aircraft.] *Akademiia Nauk, SSSR, Izvestiia, Ser. Geogr. i Geofiz.,* No. 3:334–362 **1940.** 30 tables, 11 refs. Summary in German. **DLC**—Observations from the German Weathe Service of some 1100 cases of icing are used in a synoptic, aerologic analysis to determine condition under which ice does and does not form. Influence of the following factors is considered: cloud thickness, precipitation, relative humidity, turbulence, air temperature, cloud forms, height o flight, wind, and synoptic conditions. Most frequently ice formation is observed in the inversion layer or under it, very rarely above it. In Germany heavy icing was observed mostly in the south and eastern part of the barometric minimum, and more rarely in the field of barometric maximum *Subject Headings:* **Icing of aircraft, Synoptic studies.**

I–66 551.574.42(479

*Zikeev, N. T., **Gololed v Rostovskoi oblasti i Krasnodarskom Krae.** [Glazed frost in the Rostov and Krasnodar districts.] Rostov on Don, Bris Rostovskogo Upravleniia GMS, **1940** 32 p. fig., 12 tables. **DAMS**—Report on observations of the period 1925–1939. Tables and a chart show the distribution of glaze and rime over the area. Analysis is made of temperature and wind conditions accompanying the glaze formation. *Subject Headings:* **Glaze, Caucasus, U.S.S.R.**

I–67 551.574.42(479

*Zikeev, N. T., **Gololed v Stalingradskoi oblasty i kalmytskoi ASSR.** [Glazed ice in Stalin grad area and Kalmuk ASSR.] Rostov on Don, Bris Rostovskogo Upravleniia GMS, **1940.** 30 p figs., 12 tables. **DAMS**—A work similar to that for the Rostov and Krasnodar areas (see above) for the territory of Stalingrad area and Kalmuk A.S.S.R. *Subject Headings:* **Glaze, Stalingrad Kalmuk, A.S.S.R.**

1941

I–68 551.574.7:06

Arenberg, David L. and Harney, Patrick, **The Mount Washington icing research program.** *American Meteorological Society, Bulletin,* 22:61–63, Feb. **1941.** 4 refs., 3 equations. **DWB**— Problems taken up in program are: (1) measurement of liquid water content; (2) measurement of drop size distribution; (3) structure and physical properties of rime and ice; (4) testing and possible development of de-icing equipment; (5) study of meteorological conditions necessary for severe icing. *Subject Headings:* **Icing of aircraft, Ice formation, Mount Washington Observatory.**

I–69 551.574.7:551.515.8

Browne, J. A., **Ice accretion within the convective layer.** *Transcontinental and Western Air, Inc., Meteorological Dept., Technical Note,* No. 4, Oct. **1941.** 4 p. **DWB**—Icing in lower cloud layers is discussed and conditions for its occurrence are listed: passage of a secondary cold front (or occlusion) near the center of an occluded low with freezing temperatures at the colder side, and a moderate

wind and little spread between temperature and dew point. *Subject Headings:* **Icing of aircraft, Fronts.**

I–70 551.574.7

Harrison, Louis P., **Discussion of the major factors relating to icing of aircraft with a view to securing standardization of procedure and terminology.** U. S. Weather Bureau, Washington, D. C., June 4, 1941. 7 p. **DWB**—Brief outline of factors causing icing of aircraft given. Tentative proposals made regarding terminology and procedure to be used in pilots' reports of icing. *Subject Heading:* **Icing of aircraft.**

I–71 551.574.42

Kreutz, W., **Ein Beitrag zum Nebelfroststudium.** [A contribution to the study of rime.] *Zeitschrift für angewandte Meteorologie*, 58:137–150, **1941.** 11 figs., 3 tables, ref. **DWB**—Reviewed by J. Pauly in *La Météorologie*, 3 Ser.:88–89, 1941. Thorough study of rime as it affects bodies at the surface of the earth. *Subject Heading:* **Rime.**

I–72 551.574.7:656.7

McBrien, R. L., **Icing problems in operation of transport aircraft.** *Society of Automotive Engineers, Transactions*, 49:397–408, **1941.** 38 figs., ref. **DLC**—Based on trip icing logs and test flights, different types of ice are explained and their effects on performance given. Two main classes of ice accumulation considered and shortcomings of present anti-icing equipment pointed out. It is hoped that the material presented will be helpful in planning improvements. *Subject Headings:* **Icing of aircraft, Aviation, Icing prevention.**

I–73 551.574.42(479)

*Zikeev, N. T., **Gololed v Ordzhonikidzevskom Krae, Checheno-Ingushetskoi ASSR, Severp-Osetinskoi ASSR i Kabardino-Balkarskoi ASSR.** [Glazed frost in the Ordzhonikidzev area, etc.] Rostov on Don, **1941.** 24 p. 3 figs., 14 tables, 7 refs. **DAMS**—Observations, kept from 1925–1939, and particularly those from Novo-Piatigorsk are investigated and analyzed. Tables show distribution of glaze and rime in the territory as well as temperature and wind conditions that accompany. Influence of orographical features considered. Classification of the glaze formations is set up, based on the specific gravity. Author suggests a scheme of regionalization based on intensity of glaze formations and wind velocity in the presence of glaze. *Subject Headings:* **Glaze, Caucasus, U.S.S.R.**

1942

I–74 551.574.7

†Arenberg, David L., **Meteorological factors affecting the icing of aircraft.** Massachusetts Institute of Technology, Oct. **1942.** Master's thesis. 96 p. figs., tables, 55 refs. (Manuscript [copy].) **MH-BH**—Physical conditions and meteorological conditions for icing are reviewed, as well as variations of icing with air masses and relative frequency of icing with different frontal situations. A discussion of physics of clouds and conditions in them necessary for icing follows, and then a discussion of icing factors at selected mountain stations: Mount Washington, N. H.; Sonnblick Observatory, Austria; Nordenskjöld, Spitsbergen. *Subject Heading:* **Icing of aircraft.**

I–75 551.574.42

Arenberg, D. L. and Elsner, R. W., **The microscopic structure of rime.** *American Meteorological Society, Bulletin*, 23:276–280, June **1942.** 10 figs., 8 refs. **MH-BH**—Includes ten photomicrographs of rime on glass slides and analysis of each. *Subject Heading:* **Rime.**

I–76 551.508.7:551.574.7

Gilruth, R. R., Zalovcik, J. A., and Jones, A. R., **Flight investigation of an N.A.C.A. ice-detector suitable for use as a rate-of-icing indicator.** *U. S. N.A.C.A. Wartime Report L364*, Nov. **1942.** 11 p. 18 figs. **DLC**—Tests of ice-detector reported, and the instrument is considered capable of measuring rate of icing. *Subject Heading:* **Icing meters.**

I–77 551.574.7

Minser, Edward J., **Icing of aircraft.** *Transcontinental and Western Air, Inc., Kansas City, Mo., Meteorological Dept. Technical Note*, No. 1, rev. Nov. 7, **1942.** 7 p. 6 figs. Mount Washington Observatory Library—Originally appeared in *American Meteorological Society, Bulletin*, 16:129–133, May 1935. 6 figs., 4 refs. **DWB**—The questions of when and where ice may be expected and the type and degree of formation are discussed. Precepts are presented for forecasting the occurrence of icing conditions in the free air. Figures give graphic picture of warm and cold front situations conducive to icing. *Subject Headings:* **Icing of aircraft, Icing forecasting.**

I–78 551.574.

Severo, G., **Las formaciônes de hielo en los aviones en vuelo.** [Formation of ice on airplane in flight.] *Revista Meteorológica*, 1(3):54–66, July **1942.** **DLC**—General discussion of icing o aircraft, including principle types of icing, temperature limits of formation, general meteorologica conditions favoring formation, forecasting icing from surface maps, and methods of combatting ic accretion. *Subject Heading:* **Icing of aircraft.**

I–79 551.574.

†Snell, William E. and Hannon, Paul G., **Icing on aircraft.** California Institute of Technology Meteorological Dept., Feb. **1942.** 29 p. 6 figs., 48 refs. **DWB**—Sections take up respectively th physics (theoretical considerations) and the meteorology (practical considerations) of ice formation Warm front effects discussed, as well as warm front with orographic influences, and occlusions. A practical summary lists weather conditions for different types of icing and gives a discussion of th weather map types associated with icing. *Subject Heading:* **Icing of aircraft.**

1943

I–80 551.574.

§Arenberg, David L., **Determination of icing-conditions for airplanes.** *American Geophysica Union, Transactions*, Pt. 1:99–122, Oct. **1943.** 24 figs., table, 25 equations. **MH-BH**—Fron author's summary: Analysis of various meteorological factors involved in icing with a view toward enabling better forecasts of icing conditions. Shown that icing frequency does not fall off wit temperature change and that increasing or heavy precipitation results in loss of liquid water and o icing hazard. Some discussion of apparatus. *Subject Heading:* **Icing of aircraft.**

I–81 551.574.7:551.50

Ashburn, Edward V., **Preliminary report on the forecasting of meteorological conditions favor able for the formation of ice on aircraft.** U. S. Weather Bureau, May 31, **1943.** 10 p. (Manu script.) **DWB**—Author states temperature conditions under which icing occurs in clouds and give a practical, although limited, method for forecasting temperatures. *Subject Headings:* **Icing o aircraft, Icing forecasting.**

I–82 551.574.7:629.1

Findeisen, W. and Walliser, B., **Experimenteller Nachweis der Abhängigkeit der Vereisungs grenze von der Fluggeschwindigkeit.** [Experimental evidence supporting the dependence of th icing limit upon the flying speed.] *Germany, Reichsamt für Wetterdienst, Forschungs- und Er fahrungsberichte, Ser. A*, No. 20, **1943.** U. S. Air Force Translation No. 405, by Charles Munschy 8 p. 2 figs., 14 refs., 3 equations. **DWB**—Report of detailed technical investigation. *Subjec Headings:* **Icing of aircraft, Aviation.**

I–83 551.574.

Findeisen, W., **Meteorologischer Kommentar zur D(Luft) 1209, "Vereisung."** [Meteorologica commentary on D (air) 1209, icing.] *Germany, Reichsamt für Wetterdienst, Forschungs- und Er fahrungsberichte, Ser. A.*, No. 19, **1943.** 9 p. 12 refs. **DWB**—Discussion of the icing limit and flying speed. *Subject Headings:* **Icing of aircraft, Aviation.**

I–84 551.574.

§Minser, Edward J., **A report of ice accretion on March 5, 1943.** *Transcontinental and Western Air, Inc. Meteorological Dept., Technical Note*, No. 7, July **1943.** 7 p. 18 figs. **DWB**—This incident of icing is thoroughly discussed, giving flight history, observations of ice on different parts of plane, analysis of meteorological factors and synoptic conditions. Means for aircraft of avoiding forecasted icing conditions listed. *Subject Heading:* **Icing of aircraft.**

I–85 551.574.7:629.1

U. S. Navy Dept., Bureau of Aeronautics, **Ice formation on aircraft.** *Aerology Ser.*, No. 1 Washington, **1943.** 40 p. numerous figs. **DWB**—Simplified presentation of general icing problem written for pilots. Discusses various aspects including difference between rime ice and clear ice various types of icing on seven parts of a plane, icing prevention, etc., and gives rules and advice for flying in or avoiding icing conditions. *Subject Headings:* **Icing of aircraft, Aviation.**

I–86 551.574.7:551.515.8

Wing icing conditions throughout the world. *U. S. Air Weather Service, Report*, No. 270, Sept **1943.** Prepared by Statistics Division of U. S. Weather Bureau. 40 p. 18 figs., table, 15 refs **DWB**—Situations and temperature conditions under which icing may occur are discussed and

tabulated, as well as relationship of ice crystal incidence and size of water droplets, and differences of rime, glaze, frost, etc. Meteorology of icing is taken up, with respect to warm and cold fronts, different types of clouds. World charts are plotted showing locations for the 32°F. and 0°F. isotherm for Jan., April, July, Oct.; areas of icing danger given based on use of wing de-icing boots; tracks of cyclones drawn for different months and years, emphasizing the consideration and importance of variations in the degree of frontal activity. *Subject Headings:* **Icing of aircraft, Fronts.**

1944

I–87 551.574.7(711)

Benum, Frank W. and Cameron, Hugh, **A study of ice accretion on aircraft over the Canadian Rockies.** *American Meteorological Society, Bulletin*, 25:28–33, **1944.** 5 figs., 3 tables, 2 refs. **MH-BH**—Results of statistical investigation of conditions of air temperature and stability under which icing may occur on air route over Rockies of southern British Columbia in fall, winter and spring. Conclusions drawn. *Subject Headings:* **Icing of aircraft, Canadian Rockies, British Columbia.**

I–88 551.574.7(261)

*Blake, John B., **Icing on the North Atlantic routes.** Regional Control Office, 8th Weather Region, Grenier Field, Manchester, N. H. Aug. **1944.** 20 p. 8 figs. (Mimeographed.) Mount Washington Observatory Library—Icing conditions as experienced by weather observers on C-54 trans-Atlantic aircraft Jan.–May 1944 are summarized. Sections discuss icing and, respectively: synoptic situation, temperature, time, altitude, relative humidity trace, turbulence, air routes. Data appended. *Subject Headings:* **Icing of aircraft, North Atlantic Ocean.**

I–89 551.574.7:629.13

Burke, P. M. A., **Ice accretion on aircraft.** *Dublin, Eire, Meteorological Service, Technical Notes*, 5:1–14, **1944.** 14 p. 4 figs., 6 refs. **MH-BH**—Icing is discussed from the practical viewpoint of the pilot and the air traffic control officer who may have to allocate flying heights to aircraft when the meteorological conditions are favorable to icing. Causes and types of icing indicated, and effects of ice on aircraft described. Concept of icing zones explained and particular types of icing are related to various meteorological circumstances. *Subject Headings:* **Icing of aircraft, Aviation.**

I–90 551.574.7:551.576

Hardy, J. K., **Measurement of free water in cloud under conditions of icing.** *U. S. N.A.C.A. Wartime Report* A-15, Oct. **1944.** 14 p. 2 figs., table, 5 refs., 4 equations. **DLC**—Flight measurements made of concentration of free water in clouds under conditions of icing. Methods of measurement and calculation explained. Concentration of free water is deduced from measurements of the humidity of the air after the water has been vaporized. Reduction in severity of icing by kinetic heating is discussed. *Subject Headings:* **Icing of aircraft, Water content in clouds, Icing prevention.**

I–91 551.574.42:551.508.7

*Langmuir, Irving, **Super-cooled water droplets in rising currents of cold saturated air.** Work done under Army contract W-33-106-sc-65 Precipitation Static Studies, Oct. 1943 to Aug. **1944.** 150 p. 16 figs., 39 tables, 242 equations. (Manuscript) Mount Washington Observatory Library.—**Part I. Riming data on Mt. Washington, March 1943.** The Glauert theory of the deposition of rime on a cylinder, giving the weight, width, and thickness as a function of the wind velocity, the particle size and the cylinder radius, gives reasonably consistent values for the droplet radius when the theory is applied to Mt. Wash. data. A theory of the growth of droplets in rising saturated air is developed, as well as a theory by which the droplet size is related to the product of the liquid water content of the fog and the visibility in feet. Droplet radius determinations made by the Houghton-Radford method and by the sooted-slide method. *Subject Headings:* **Rime, Icing meters, Water content of clouds, Drop size distribution.**

I–92 551.574.7 551.509.39

Similä, A., **Eine praktische Methode zur Prognose der Vereisung mit Hilfe aerologischer Messungen.** [A practical method of forecasting icing by means of aerologic measurements.] Finland, *Ilmatieteellisen Keskuslaitoksen toimituksia*, No. 22, **1944.** 10 p. 3 figs., 3 tables, refs. **DWB**—A method is given for determining conditions under which supercooled cloud vapor will condense on an object, by means of three tables based on relations between temperature, ice saturation, relative humidity, vapor pressure, etc. *Subject Headings:* **Icing of aircraft, Icing forecasting.**

I–93 551.576:551.508.765

Tolefson, H. B., **Flight measurement of liquid-water content of clouds and precipitation regions.** *XC-35 Gust Research Project Bulletin*, No. 9. U. S. N.A.C.A. Restricted (now declassified) Bulletin

No. L4E17, May **1944.** 7 p. 6 figs., table, 5 refs. Mount Washington Observatory Library—Measurements of the liquid water content of clouds and precipitation regions were obtained a altitudes varying from 200 feet to 15,000 feet by means of a rain collector on an airplane. *Subjec Headings:* **Water content of clouds, Cloud meters.**

I–94 551.574.

†Zamorski, A. D., **Meteorological conditions for ice formation.** Original in Russian by People' Commissariat for Defense, USSR, Central Office of the Hydrometeorological Service of the Re Army, Central Geophysical Observatory. Translated Jan. 5, **1944.** NAVAER 50-IR-106. 21 p 13 figs., 24 tables, 13 refs. **DWB**—The usual aircraft soundings of the atmosphere were investigate to determine principal meteorological conditions for icing of aircraft. Data of the German airplan soundings made in 1938 at Hamburg, Kologne, etc., were used, as well as some data obtained i 1936 at Munich, Kologne, and Königsberg. Various sections discuss: classification of icing o aircraft; ice formation and phase of water in clouds; effect of amount and thickness of clouds on ic formation; temperature, relative humidity, wind velocity, and synoptic situation in relation t icing. Contains references to some Russian work on icing as late as 1941. *Subject Headings:* **Icin of aircraft, Germany.**

1945

I–95 551.574.7:0

Allen, R. A., **Minutes of meeting regarding icing research at Mount Washington, N. H.** U. S Weather Bureau, Washington, **1945.** 30 p. **DWB**—Outline summary of work done at Mt. Wash ington, 1944–1945, given, as well as summaries of work done by B. F. Goodrich Co., and by Genera Electric Co., M.I.T., Princeton, etc. Other reports given deal with synoptic icing observations cloud drop and liquid water instruments and observations, wind, temperature, and humidity instru ments and observations, icing rate and ice structure, personnel, testing program, etc. Discussion are included. *Subject Headings:* **Icing of aircraft, Icing research, Mount Washington Observatory**

I–96 551.576.1:551.501:551.508.765

Clark, Victor F., **Liquid water and drop size measurement during June and July 1945.** *Moun Washington Observatory Icing Report*—July **1945,** Vol. 1, No. 7. Mount Washington Observatory Library—Exhaustive evaluation of observational methods and techniques used on Mt. Wash. up t that time. *Subject Headings:* **Icing research, Water content of clouds, Drop size distribution.**

I–97 551.574.7

Gershzohn, M. **Propeller icing.** *Journal of Aeronautical Meteorology,* 2(1):13–17, Oct. **1945** 4 figs., table, 3 equations. **DLC**—Regions of the propeller which normally ice up are pointed ou and simple procedures are suggested to partially de-ice propellers whose speed can be varied. Oc currence of ice correlated with temperature. *Subject Headings:* **Icing of aircraft, Icing prevention.**

I–98 551.574.7:551.508.7:551.576:0

Langmuir, Irving, **Final report on icing research up to July 1, 1945.** General Electric Co. Research Laboratories, Oct. **1945.** 33 p. 2 tables, 7 equations. (Mimeographed) Mount Wash ington Observatory Library—Contains list of reports under Contract No. W-33-038-AC-9151 (14006) with the Air Technical Service Command. Study made of fundamental phenomena involved i icing of aircraft: meteorological aspects, cloud physics, water droplets in clouds, etc.; phenomena o ice deposition; and icing prevention. It is concluded that for determination of liquid water content and average drop size in clouds ice deposition on rotating multicylinders is most trustworthy pro cedure. Brief resumé of General Electric instrumentation program. Suggestions for further knowledge in icing problem listed. *Subject Headings:* **Icing of aircraft, Cloud physics, Icing research, Icing meters.**

I–99 551.575:551.574.7:551.508.7

Langmuir, Irving, **The cooling of cylinders by fog moving at high velocities.** General Electric Co. Research Laboratories, March **1945.** 41 p. 18 tables, 82 equations. (Mimeographed.) Mount Washington Observatory Library—Consideration of the problem of aerodynamic heating and air temperature at the leading edge of an airfoil complicated by the presence of fog. Concluded that the temperature of the air at the stagnation point can be calculated accurately from the pressure change by the dry adiabatic curve—even in fog. Thus the problem of considering air temperature at leading edge of airfoil is simplified, and detailed study of conditions that lead to ice deposition on leading edge is possible. *Subject Headings:* **Icing of aircraft, Fog, Icing meters.**

I–100 551.574.7:551.508.765

*Langmuir, Irving and Blodgett, Katharine B., **A mathematical investigation of water droplet trajectories.** General Electric Company, July **1945.** 47 p. 14 figs., 11 tables, 46 equations.

Mount Washington Observatory Library—Detailed theoretical work. Calculations given of trajectories of small water droplets in air moving at high velocities across a cylinder. Development of theory of cloud droplet interception by airfoils from which quantitative impingement rates and area of catch for particular conditions may be calculated. Example given of analysis of experimental data by means of theoretical curves thus attained. Basic theory in multicylinder method for icing and cloud drop measurement. *Subject Headings:* **Icing instruments, Drop size distribution, Impingement.**

I–101 551.501.4:551.508.765:551.576

*Massachusetts Institute of Technology, De-icing Laboratory, **Reduction of rotating cylinder data; instructions for calculating the liquid water content, effective drop size and effective drop distributions from rotating cylinder data obtained from average speed aircraft.** Cambridge, Mass., Oct. 1945. 15 figs. (a series of graphs). Mount Washington Observatory Library. *Subject Headings:* **Icing meters, Water content of clouds, Drop size distribution.**

I–102 551.574.7

*North, David, **Summary of DC-3 flights in icing conditions during winter of 1944–1945.** *American Airlines, Inc. Engineering Dept., N. Y. Municipal Airport, La Guardia Field, N. Y. Report,* No. DC-3-1999 XIR. 25 p. table. (Mimeographed.) Mount Washington Observatory Library—One hundred pilots' reports summarized, describing icing conditions winter of 1944–1945. Conclusions drawn as to months and areas, etc. of icing, and recommendations made. *Subject Heading:* **Icing of aircraft.**

I–103 551.574.7:551.524.7(798)

Serbein, O. N., **Certain aspects of aircraft icing in the Alaskan-Aleutian area.** *American Meteorological Society, Bulletin,* 26:419-425, **1945.** fig., 2 tables. **DWB**—Based on data obtained during flights Oct. 1943 to Sept. 1944. Effect of temperature and turbulence considered. *Subject Headings:* **Icing of aircraft, Upper air temperatures, Turbulence, Alaska, Aleutians.**

1946

I–104 551.508.7

Barner, **Vereisungsmessgeraet Type C-160.** Translated by Oscar Imalis, Ice formation measuring equipment type C-160. *U. S. Air Force Translation,* No. 611, Sept. **1946.** 6 p. 4 figs. **DLC**—The method investigated consists in observing the increase in capacity of an air condenser by introduction of ice into its stray field. Test model of device is described. *Subject Heading:* **Icing meters.**

I–105 551.574.7

Boeke, F. L. and Paselk, R. A., **Icing problems and the thermal anti-icing systems.** *Journal of the Aeronautical Sciences,* 13:485–497, Sept. **1946.** 19 figs., 2 tables, 7 refs., 46 equations. **DLC**—Atmospheric conditions and theory of ice formation are presented as introductory to the problem of thermal anti-icing system design. Historical summary given of ice prevention methods followed by thorough highly technical discussion of thermal anti-icing method. *Subject Headings:* **Icing of aircraft, Icing prevention.**

I–106 551.574.7

Boelter, L. M. K., **Final report—icing studies.** Contract W-33-038-ac-13489 (15396), University of California, Los Angeles, Calif., Aug. **1946.** (Unchecked)—*Subject Heading:* **Icing research.**

I–107 551.576:551.508.765

Brock, George W., **Liquid water content and droplet size in clouds of the atmosphere.** *U. S. Air Materiel Command, Aeronautical Ice Research Laboratory Engineering Report,* No. IRB-46-24-1P, April **1946.** 8 p. 4 figs., table, 7 refs. Mount Washington Observatory Library—*Subject Headings:* **Water content in clouds, Drop size distribution.**

I–108 551.574.7

Christenson, C. M., **Aircraft icing revelations lighten trying tasks of designer and pilot.** *Society of Automotive Engineers, Journal,* 54:103–104, Oct. **1946. DLC**—Report of results of flight tests on icing of aircraft that can aid the engineer in designing the airplane and perfecting anti-icing equipment and the pilot in minimizing ice formations during flight. Ice types classified as crystalline and filming. *Subject Headings:* **Icing of aircraft, Icing prevention.**

I–109 551.574.7

Conrad, Victor, **Statistical investigation of the Mount Washington series of icing observations.** Pt. 1. of the *Mount Washington Observatory Monthly Research Bulletin,* Vol. 2, No. 10, Oct. **1946.**

Preliminary Report with introduction and discussion by W. E. Howell. 17 p. 9 figs., 3 tables. **MH-BH**—Detailed analysis is made of observations of rate of accumulation and density of ice on rotating, cylindrical collectors, at Mt. Wash., since 1942, as well as of observations of sizes of cloud droplets and elevation of the cloud base and other meteorological elements. Extensive calculations made. **Part II. The water content of clouds.** Reprint of paper by Victor Conrad, 1901. (*See item* I–1 above.) *Subject Headings:* **Icing of aircraft, Icing meters, Drop size distribution.**

I–110 551.574.7:551.508.765

*Diem, Max, **Beiträge zur Frage der Vereisung.** [Contributions to the problem of ice formation.] *Deutsche Forschungsanstalt für Segelflug*, No. 1482, Oct. 1941. Translation by Ella Vellier, *U. S. Air Force Translation*, No. F-TS-533-RE, May **1946.** 16 p. 11 figs., 3 tables, 8 refs., equation. **DLC**—Results of icing research flights are reported, and theoretical derivations pertaining to ice deposits on parts of the airplane are explained. Methods for measuring ice accumulation and for determining size of droplets in clouds are given. *Subject Headings:* **Icing of aircraft, Drop size distribution.**

I–111 551.574.7:551.508.7:06

Dolezel, Edward J., Cunningham, Robert M., and Katz, Robert E., **Progress in icing research.** *American Meteorological Society, Bulletin*, 27:261–271, June **1946.** 8 figs. **DWB**—Non-technical survey made of research being done on meteorological aspects of aircraft icing, including organization of the program and functions of four installations in the U. S. Short qualitative discussion of flow around cylinders given; several new specialized instruments described as well as some of theory developed to interpret their data. *Subject Headings:* **Icing of aircraft, Icing meters, Icing research.**

I–112 551.508.7

Goss, Jack K., **Rotating disc icing meter—IRB model 2.** *U. S. Air Materiel Command, Aeronautical Ice Research Laboratory Engineering Report*, No. IRB-46-39-4P, July **1946.** 2 p. 2 diagr. and 5 photos of the meter. (Manuscript.) Mt. Washington Observatory Library—Report on development of rotating disc icing rate meter. *Subject Heading:* **Icing meters.**

I–113 551.574.7:551.508.7:551.506

*Howell, Wallace E., **Instructions for making icing observations by the multi-cylinder method.** *Mount Washington Observatory, Monthly Research Bulletin*, 2, no. 12, Dec. **1946.** 7 p. Mt. Washington Observatory Library—Paper supplements information on the multicylinder method, in the *Mt. Wash., Bulletin*, Vol. 2, No. 6, June 1946, by describing facilities and equipment used in association with the multicylinder instrument and the manner of conducting an observation. This bulletin also contains: by W. E. Howell, **A system for the protection of Pitot tube pressure lines from ice.** 3 p. And: **Test of silicone lubrication for cameras.** 3 p. And: **Mt. Washington Observatory daily cloud data summary for Dec. 1946.** *Subject Headings:* **Icing of aircraft, Icing meters, Icing prevention, Observational data.**

I–114 551.574.7:551.508.7

Loughborough, D. L., **The density of ice collected on rotating cylinders.** *B. F. Goodrich, Research Report*, Prob. No. P15.01, July 29, **1946.** 6 p. 8 figs., 3 tables, equation. (Mimeographed.) Mt. Washington Observatory Library—Concluded that from a study of the cylinder data from Mt. Wash. for 47 runs (April 1946) a definite relation between the collection efficiency and density of the deposited ice has been found. Equation given. Significant in making calculations of density, strength, etc. of ice, as well as a physical law in further study of icing. *Subject Heading:* **Icing meters.**

I–115 551.506:551.574.7:551.508.7

*Mount Washington Observatory, **Monthly research bulletins. 1945–1946.** Mount Washington Observatory Library—Twelve numbers of Vol. 1 and first five numbers of Vol. 2 are **Monthly icing report series.** Recipients of mountain icing data are listed. Included are: daily icing observation summaries for each month, monthly icing summaries for each month, tables for six cylinders of ratio experimental value to theoretical values, and other considerations and commentaries on each month's icing report.

Vol. 2, No. 6, **1946,** is **The multi-cyclinder method.** 33 p. 16 figs., 5 tables. Information is given for using multicylinder method of measurement of water content, drop size, and related phenomena in clouds, said to be the only really reliable method for measuring such phenomena. *Subject Headings:* **Icing of aircraft, Icing meters, Observational data.**

I–116 551.574.7

Olsen, Albert F., **Survey of icing research.** *U. S. Air Technical Service Command, Engineering Division Technical Note*, Serial No. TN-TSEST-5-9, Wright Field, Ohio, March **1946.** 29 p. Mount

Washington Observatory Library—Report of a survey of 45 agencies for the purpose of gathering information on icing research and to indicate need for further such research. Problems presented in a generalized manner, and recommendations made for further research. Appendix I contains a list of projects suggested by the various agencies. Appendix II is a list of the agencies. *Subject Heading:* **Icing research.**

I–117 551.574.7(798)

Taylor, B. and Serbein, O., **Temperature and probability of icing in the Alaskan-Aleutian area.** *American Meteorological Society, Bulletin*, 27:580–588, Dec. **1946.** fig., 6 tables, ref. **DWB**—Figure shows incidence of aircraft icing with various temperatures in area. Six tables constructed to determine probability under specific conditions and positions of encountering visible moisture; of encountering aircraft ice regardless of visible moisture; and of icing with given temperature, place, altitude and season, plus visible moisture. Explanation of observed facts is given. *Subject Headings:* **Icing of aircraft, Alaska, Aleutians.**

I–118 551.574.7(798)

*Taylor, Benjamin F., **A supplementary report to "A case study of icing in the Alaskan-Aleutian area (Oct. '43–Apr. '44)."** U. S. Air Forces, Weather Central, 11th Weather Region, Feb. 12, **1946.** 6 p. 17 figs., 6 tables. **DWB**—Charts plot aircraft icing and temperature at different altitudes along various air routes in Alaska-Aleutian area. Tables plot altitudes and temperature intervals, along with the question: given a place, altitude and season, what is the probability of sufficient moisture being present to permit ice formation. *Subject Headings:* **Icing of aircraft, Alaska, Aleutians.**

I–119 551.574.7

*Tribus, Myron, **Report on the development and application of heated wings.** Addendum 1. *U. S. Air Force, Air Technical Service Command, Technical Report*, 4972, Wright Field, Ohio, Jan. **1946.** 120 p. 59 figs., 12 tables, 22 refs., equations. Mount Washington Observatory Library—Qualitative understanding of why a heated wing works is sought, as well as quantitative design data on: a) heat transfer coefficients for air flowing in the double skin structure and over the outer surface; b) the meteorology of the icing condition; size and number of droplets in an icing cloud; c) the interception of drops by an airfoil. Extensive and detailed data are recorded. *Subject Headings:* **Icing of aircraft, Icing prevention.**

I–120 551.574.7 551.508.765

†U. S. Air Materiel Command, **Basic icing research by General Electric Co. fiscal year 1946.** *U. S. Air Forces, Technical Report*, 5539, Wright Field, Ohio, **1947.** 201 p. figs., tables, refs. Contains 11 reports. Mount Washington Observatory Library, and some of reports at **DWB**—Reports by Vincent J. Schaefer:

(1) **Final report on icing research up to July 1, 1946.** 45 p. 2 tables, refs. Includes index of 28 reports issued by General Electric Research Laboratories in the field of icing and precipitation static. **DWB, MH-BH**—Review of instrumentation, development and operation; aspects of cloud physics; ice deposit records; de-icers; proposed future studies.

(2) **Report on General Electric cloud meter.**

(3) **Demountable rotating multi-cylinders for measuring liquid water content and particle size of clouds in above and below freezing temperatures.**

(4) **The liquid water content of summer clouds on the summit of Mt. Washington.** 12 p. 5 figs., table, 4 refs. **DWB**—Data on amounts and variations of liquid water content of summer clouds and instrument used to obtain the data are discussed.

(5) **Heat requirements for instruments and airfoils during icing storms on Mt. Washington.** 12 p. fig., 5 tables. **DWB**—Detailed study made and conclusions drawn.

(6) **The preparation and use of water sensitive coatings for sampling cloud particles.**

(7) **A heated, vaned pitot tube and recorder for measuring air speed under severe icing conditions.** 5 p. 3 figs., 4 refs. **DWB**—Use described of instrument for measuring wind velocity which is an important factor in icing.

(8) **The use of high speed model propellers for studying de-icing coatings at Mt. Washington Observatory.** 4 p. fig., 4 refs. **DWB**—

Reports by Robert Smith-Johannsen:

(9) **Effect of impurities in water on ice adhesion. Pt. I.** 10 p. 2 figs., photos, table. (10) **Part II.** 16 p. 4 figs., 3 tables, 8 refs. **DWB**—Tests run and results reported of varying effects of different impurities in water on the manner of its freezing and the adhesion of ice formed from it.

(11) **The "peel off" mechanical wing de-icer.**
Subject Headings: **Icing of aircraft, Cloud meters, Icing prevention, Water content of clouds, Ice formation.**

I–121 551.508.7:551.574.7

*§Vonnegut, B., Cunningham, R. M., and Katz, R. E., **Instruments for measuring atmospheric factors related to ice formation on airplanes.** Massachusetts Institute of Technology, Dept. of Meteorology, De-icing Research Laboratory, Cambridge, Mass., **1946.** Also: U. S. Air Materiel Command, *Air Forces Report* 5519, Aug. **1946.** 103 p. 54 figs., 6 tables, equations. **DLC**—A detailed, well-illustrated review is given of many of the instruments developed or in process of being developed under the contract with the Air Technical Service Command. Included are analyses of design, operation, data, limitations etc., of: rotating cylinders, drop size measurement, rotating magnetic disc icing rate meter, capillary collector, electric water collection rate meter, anti-icing heat meter, and spray tunnels. A summary of the nature of icing conditions is contained in the introduction. Data and synoptic reports from actual flight tests are used for discussion of problems in the relationship between cloud forming conditions and resulting liquid water content and drop size. *Subject Headings:* **Icing meters, Water content of clouds, Drop size distribution.**

I–122 551.574.7:551.515.8

*Whipple, Parker C., **Icing in relation to air masses and fronts.** 20 p. 7 figs., 9 tables, 8 graphs appended, daily cold data summaries for Nov. 1946, appended. (Mimeographed.) **MH-BH**—Investigation to determine relation between deviation of icing conditions, rate of ice accumulation and the air masses and fronts that prevail when icing conditions occur. General relations are found; yet icing conditions vary from one storm to another and perhaps also within individual storms to a degree which tends to overshadow characteristics common to storms in general and makes forecasting from synoptic indications alone an unsatisfactory procedure. *Subject Headings:* **Icing of aircraft, Icing forecasting, Fronts.**

1947

I–123 551.574.7

*Bergrun, Norman R., **A method for numerically calculating the area and distribution of water impingement on the leading edge of an airfoil in a cloud.** *U. S. N.A.C.A. Technical Notes*, No. 1397, Aug. **1947.** 32 p. 11 figs., 2 tables, 6 refs., equations. **DLC**—A method is presented for determining, by step-by-step integration, the trajectories of water drops around any body in two-dimensional flow for which the streamline velocity components are known or can be computed. Consideration is given to the maximum possible rate of water drop impingement on a body. *Subject Headings:* **Icing of aircraft, Impingement.**—*From author's abstract.*

I–124 551.574.7

Brock, George W., **An analysis of weather conditions existing in various locations in the United States that are conducive to ice formation on aircraft.** *U. S. Air Materiel Command, Aeronautical Ice Research Laboratory, Engineering Report*, No. AIRL 46-56-1P, May **1947.** 2 p. 6 figs. Mt. Washington Observatory Library—Charts show mean virtual temperatures, sea level to 10,000 ft. for Jan., April, July, Oct., and 10,000 ft. pressure for Jan. *Subject Heading:* **Icing of aircraft.**

I–125 551.574.7:551.508.7

*Downie, Currie S., **Meteorological research on aircraft icing at the Aeronautical Research Laboratory, Nov. 1947.** 17 p. 12 figs., table, 22 refs. (Mimeographed.) Mt. Washington Observatory Library—Non-technical survey of icing research at laboratory. Instruments for measuring icing intensity variables surveyed. Theories on formation of clouds conducive to icing summarized. Data on droplet diameters and liquid water content presented. *Subject Headings:* **Icing of aircraft, Icing research, Water content of clouds.**

I–126 551.508.7:551.574.7

Downie, Currie S., **The rotating cylinder method for obtaining icing intensity data.** *U. S. Air Materiel Command, Aeronautical Ice Research Laboratory, Report*, No. AIRL 48-3-2P, Sept. **1947.** 26 p. 20 charts. (Mimeographed.) Mt. Washington Observatory Library—*Subject Heading:* **Icing meters.**

I–127 551.578.7:551.574.7:551.558.1

Gaviola, E. and Fuertes, F. Alsina, **Hail formation, vertical currents, and icing of aircraft.** *Journal of Meteorology*, 4:117–120, Aug. **1947.** table, 11 refs., 3 equations. **MH-BH**—Stated that icing of aircraft appears to follow the same pattern as hail formation. *Subject Headings:* **Icing of aircraft, Hail, Vertical currents.**

I–128 551.574.7:656.7

Gunn, Ross, **In-flight icing of highly electrified aircraft.** *Journal of the Aeronautical Sciences*, 14(9):527–528, Sept. 1947. fig., 3 refs. **MH-BH**—The suggestion that a highly electrified airplane will not ice up in normal icing conditions is examined. Tests with an artificial charger on an aircraft in flight and on electrified probes mounted on an experimental airplane have shown that the electrification has no measurable effect on aircraft icing. *Subject Headings:* **Icing of aircraft, Icing prevention.**—*Author's abstract.*

I–129 551.574.7

†*Harvard-Mount Washington Icing Research Report 1946–1947. *U. S. Air Materiel Command, Wright Field, Ohio, Technical Report*, No. 5676. 802 p. numerous figs., tables, refs., equations. **MH-BH**—List of 30 articles:

1. **Summary of researches.**
2. Whipple, Parker, **Icing in relation to air masses and fronts.**
3. Howell, Wallace E. and Whipple, Parker, **Lapse rate in relation to icing.**
4. Burhoe, Ralph W., **Duration of icing at selected intensities on Mount Washington.**
5. Burhoe, Ralph W., **Icing on Mount Washington and the synoptic weather situation.**
6. Smith, Robert B., **Icing at Mount Washington near the tops of cloud layers.**
7. Howell, W. E., **Preliminary report on the relation of icing to turbulence at Mount Washington.**
8. Conrad, Victor, **Preliminary report on statistical investigation of the Mount Washington series of icing observations.**
9. Conrad Victor, **Second report on the statistical investigations of icing.** 10. **Third report—.**
11. Clark, Victor, **Conditions for run off and blow-off of catch on multicylinder icing meter.**
12. Smith, Robert B., **On the usefulness of cylinder collection efficiency curves for rare drop size distributions.**
13. Howell, W. E., **Report on the Harvard Mount Washington icing meter.**
14. Howell, W. E., **A system for the protection of Pitot tube pressure lines from ice.**
15. Smith, Robert B., **The effect of surface treatments on the heat requirements for ice protection of small instruments.**
16. Smith, Robert B., **Development and testing of an instrument for measuring snow content of the air.**
17. Fergusson, S. P., **Variations of the wind near the ground on the summit of Mount Washington and apparatus for measurement.**
18. Howell, W. E., **Contribution to the evaluation of the multicylinder icing meter.**
19. Howell, W. E., **Effect of the vertical gradients of wind speed and water content on measurements with the multicylinder icing meter.**
20. Howell, W. E., **Comparative measurements of cloud drop sizes and size distributions by multicylinder and impact methods.**
21. Howell, W. E., **Experiments with a ranging chamber for measuring drop size distribution.**
22. Howell, W. E., **Preliminary report on comparative observations of ice accumulation on airfoils, spheres, cones, ribbons, and stationary and rotating cylinders.**
23. Brooks, Charles F., **Is there an altitude above which icing will not occur or will be negligible?**
24. Howell, W. E., **Experiments in the nucleation of clouds with dry ice.**
25. Clark, Victor, **Occurrence of icing at temperatures near the self-nucleating critical limit (−35°C.).**
26. Clark, Victor, **Graphs of maximum liquid water content in clouds.**
27. Clark, Victor, **Icing nomenclature.**
28. Weickmann, Helmut, **Experimental investigations in formation of ice and water nuclei at low temperatures; inferences regarding the growth of atmospheric ice crystals.** (Translation.)
29. Schwerdtfeger, W., **Comparison of the conditions for the formation of water drops and ice particles.** (Translation.)
30. **Routine and cloud data observations, Nov. 1946 through May 1947.**

Subject Headings: **Icing of aircraft, Icing meters, Icing prevention, Cloud physics, Observational data.**

I–130 551.574.7:551.501

*Jones, Alun R., Holdaway, George H., and Steinmitz, Charles P., **A method for calculating the heat required for windshield thermal ice prevention based on extensive flight tests in natural icing conditions.** *U. S. N.A.C.A. Technical Note*, No. 1434, Nov. 1947. 101 p. 31 figs., 10 tables, 11 refs., 22 equations. **DLC**—A method of determining the rate of droplet impingement on an airplane windshield is developed. Data of flight tests included. *Subject Headings:* **Icing of aircraft, Impingement.**

I–131 551.574.7

Lewis, William, **A flight investigation of the meteorological conditions conducive to the formation of ice on airplanes.** *U. S. N.A.C.A. Technical Note*, No. 1393, Aug. **1947.** 52 p. 16 figs., 2 tables, 14 refs. **DWB, DLC**—Meteorological factors related to the intensity of icing conditions discussed. Methods of observation and the results obtained are presented. Progress made in forecasting the intensity of icing condition and in defining the maximum icing condition against which adequate protection should be provided discussed. Flight measurements made of liquid water content and drop diameter in clouds. *Subject Headings:* **Icing of aircraft, Icing forecasting, Water content in clouds.**—*M.R.*

I–132 551.574.7

*Lewis, William, Kline, Dwight B., and Steinmetz, Charles P., **A further investigation of the meteorological conditions conducive to aircraft icing.** *U. S. N.A.C.A. Technical Note*, No. 1424, Oct. **1947.** 26 p. 6 figs., 2 tables, 4 refs. **DWB, DLC**—This report summarizes for the season 1946-1947 the same type data contained in above report by Lewis. Data on liquid water content temperature and drop diameter agree with that for previous report. The relation between maximum liquid water content and temperature in layer clouds is discussed. A table shows the number of observed cases of various intensities in different cloud types with various ranges of water content. Drop size distribution data calculated in different ways, compared. Meteorological data obtained during icing conditions on 30 flights in various parts of the country and on 49 flights from the Flight Propulsion Research Lab. are given. *Subject Headings:* **Icing of aircraft, Drop size distribution.**—*M.R.*

I–133 551.574.7:551.576.3:551.515.8

Lewis, William, **Icing properties of noncyclonic winter stratus clouds.** *U. S. N.A.C.A. Technical Note*, No. 1391, Sept. **1947.** 12 p. 4 figs., 2 refs. **DWB, DLC**—Measurements of the vertical distribution of liquid water concentration and drop size are made in winter stratus clouds in the absence of significant cyclonic or frontal activity. Calculations made and graphically illustrated. *Subject Headings:* **Icing of aircraft, Stratus clouds, Fronts.**—*From author's summary.*

I–134 551.574.7:551.515.8

§Lewis, William, **Icing zones in a warm front system with general precipitation.** *U. S. N.A.C.A. Technical Note*, No. 1392, July **1947.** 9 p. 7 figs., 3 refs. **DWB, DLC**—Observation of the icing zones present in a warm front cloud system made during one of a series of flights designed to investigate meteorological conditions conducive to formation of ice on aircraft. Concluded that in large areas of uniform precipitation in the absence of marked orographic effects, the icing zones are limited to the freezing rain area, if any, and a shallow layer of mixed snow and cloud drops just above the freezing level. *Subject Headings:* **Icing of aircraft, Warm fronts.**—*From author's summary.*

I–135 551.574.42:551.576:551.50

*Mount Washington Observatory, **Mount Washington daily and monthly summaries.** Jan.–May **1947.** Mount Washington Observatory Library—Original cloud observational data summaries for each day taken at three hour intervals. *Subject Headings:* **Observational data, Clouds, Rime.**

I–136 551.574.7

†Neel, Carr B., Jr., and others, **The calculation of the heat required for wing thermal ice prevention in specified icing conditions.** *U. S. N.A.C.A. Technical Note*, No. 1472, **1947.** 107 p. 30 figs., 5 tables, 26 refs. **DLC**—As a result of investigation of meteorological conditions for icing on aircraft and a study of the process of airfoil thermal ice prevention, equations for calculating rate of heat transfer from airfoils in icing conditions were verified, and reasonably accurate calculations of airfoil heat requirements could be made. Tables of data from flight tests in natural icing conditions include measurements of meteorological variables made simultaneously with airfoil thermal measurements. Concluded that the design of heated wings on a fundamental, wet-air basis can be undertaken as a result of the extent of the knowledge gained. *Subject Headings:* **Icing of aircraft, Icing prevention.**

I–137 551.574.7

Spencer, K. T., **Aircraft icing.** *Journal of Glaciology*, London, 1:68–69, **1947.** (Unchecked)—*Subject Heading:* **Icing of aircraft.**

I–138 551.508.7:551.574.7

Wherry, Don M., **Rotating disc icing rate meter.** *U. S. Air Materiel Command, Aeronautical Ice Research Laboratory, Engineering Report*, Serial No. AIRL 46-67-1P, June **1947.** 4 p. 4 figs. equation. (Mimeographed.) Mt. Washington Observatory Library—Discussion of further de

velopments of the design as previously reported and the results of test runs made simultaneously with the rotating cylinders. Conclusions and recommendations. *Subject Heading:* **Icing meters.**

1948

I–139 551.574.7

Bergrun, Norman R., **General results of N.A.C.A. flight research in natural icing conditions during the winters of 1945 and 1946.** *Aeronautical Engineering Review*, 7:20–27, Jan. **1948.** 12 figs., 12 refs. **DLC**—Report of flight tests in natural icing conditions in which meteorological factors and heat requirements for ice protection were measured. Meteorological measurements of altitude, free air temperature, liquid water content, and drop size were obtained for both layer- and cumulus-type clouds. In some instances, corresponding heat transfer data were obtained for the heated test equipment. Conclusions drawn. *Subject Headings:* **Icing of aircraft, icing prevention.**

I–140 551.574.7(41)

*Cochemé, Jacques. **Note on some cases of aircraft icing.** *Meteorological Magazine, London*, 77:33–38, **1948.** table. **DWB**—Results of flight observations of meteorological and icing conditions over Scilly, parts of Ireland and of southern England tabulated. *Subject Headings:* **Icing of aircraft, Great Britain.**

I–141 551.501.81:551.574.7

§Cunningham, Robert and Miller, R., **Five weather radar flights.** *Massachusetts Institute of Technology, Weather Radar Research Unit, Technical Report*, No. 7, Dec. **1948.** 54 p. 81 figs., 19 refs. **MH-BH**—Accurate and detailed measurements are reported taken by radar of five selected cases of storms illustrating five different types of weather situations. Instruments and radar systems used are described along with observational procedures and details of weather situations. In several incidences icing conditions are noted and analyzed and radar means of detecting them illustrated. *Subject Headings:* **Icing of aircraft, Radar storm detection.**

I–142 532.77:551.574.1

†Dorsey, Ernest N., **The freezing of supercooled water.** *American Philosophical Society, Transactions*, 38, Pt. 3:248–328, Nov. **1948.** 33 figs., 10 tables, 98 refs., plus numerous supplemental refs. Mt. Washington Observatory Library—Extensive investigation of supercooling and freezing of many specimens of water and results compared with the homogeneous or kinetic theory of freezing. Incompatibilities found and errors pointed out. A new and explicit heterogeneous theory of freezing outlined and discussed. Incidental observations of other phenomena associated with freezing also recorded. *Subject Headings:* **Supercooled water, Freezing nuclei, Ice formation.**

I–143 551.508.765

Falconer, Raymond E. and Schaefer, V. J., **A new plane model cloud meter.** *General Electric Research Laboratory, Occasional Report*, No. 2, *Project Cirrus*, Schenectady, N. Y., May **1948.** 10 p. 6 figs., table. **MH-BH**—Method and operation of General Electric cloud meter described for use in detailed analysis of variations in liquid water content within a cloud. Results of some tests included. *Subject Headings:* **Cloud meters, Water content in clouds.**

I–144 551.501.4

Hensley, Reece, V., **Mollier diagrams for air saturated with water vapor at low temperatures.** *U. S. N.A.C.A. Technical Note*, No. 1715, Sept. **1948.** 16 p. 2 figs., 3 refs., equations. **DLC**—Two Mollier diagrams relating the thermodynamic properties of air saturated with water vapor in equilibrium with water and with ice at low temperatures are presented. The development of the charts is given and their use in the solution of problems involving thermodynamic processes of mixtures of air and water is explained. A temperature range of 400° to 540° R and a pressure range of 2 to 28 pounds per square inch absolute were chosen in order that the charts would be of greatest utility in considering problems concerned with the icing of aircraft. Several examples illustrate the use of the diagrams. *Subject Heading:* **Nomograms.**—*Author's summary.*

I–145 551.574.7

Icing in jets. *Canadian Aviation*, 21(1):20–23+, Jan. **1948.** photos. **DLC**—Preliminary report of jet engine icing research of National Research Council of Canada, conducted mostly in laboratory. *Subject Headings:* **Icing of aircraft, Jets.**

I–146 551.574.7:551.508.7

Katz, R. E. and Cunningham, R. M., **Aircraft icing instruments; instruments for measuring atmospheric factors related to ice formation on airplanes. II.** Massachusetts Institute of Technology, Dept. of Meteorology, De-icing Research Laboratory, Cambridge, Mass., March **1948.** 29 p.

16 figs., 4 refs. Mt. Washington Observatory Library—Supplementary report to I–121, (Vonnegut others, 1946), describing research on same line since June 30, 1945. Detailed, well-illustrate discussion of instrumental developments and operation includes: icing rate meter; liquid wate content measurement by capillary collector; microrotameter and orifice type flow meter; and spra tunnels: the small tunnel and the new high-speed tunnel. *Subject Headings:* **Icing meters, Wate content in clouds.**

I–147 551.594.25:551.574.42:551.578.

Kramer, C., **Electrische ladingen aan berijpte oppervlakken.** [Electric charges on rime covered surfaces.] Koninlijk Nederlands Meteorologisch Instituut, No. 102, *Mededelingen e Verhandelingen, Ser. A*, 54, The Hague, **1948.** 128 p. 17 figs., 11 tables, 75 refs., numerous equa tions. Summaries in Dutch, English and German p. 120–126. **DWB**—A substantial contributio to precise knowledge of the subject, inspired by the work of Lange (*Met. Zeit.*, 1940, p. 429) an Findeisen (*ibid.*, p. 201), with reference to the potential on growing rime formations and electrica phenomena attending the formation, growth and evaporation of ice crystals. Lange's results wer confirmed but Findeisen's conclusion that positive charges are formed on rime was found to b erroneous—in fact a negative charge was observed. The rate of charge was found proportional t the velocity of the attending air currents and if a sudden increase in speed occurs, a sudden jump i charge occurs likewise. Elaborate equipment was developed and is illustrated in detail along wit resulting data. *Subject Headings:* **Electricity of precipitation, Icing of aircraft, Rime formation.**— *M.R.*

I–148 551.508.7

Malkus, Willem V. R., Bishop, Richard D., and Briggs, Robert O., **Analysis and preliminar design of an optical instrument for the measurement of drop size and free-water content of cloud** *U. S. N.A.C.A. Technical Note*, No. 1622, June **1948.** 59 p. 17 figs., 6 refs., equations. **DLC**— Method described for determination of drop size and free water in clouds, based on the interpretatio of an artificially created rainbow. Details of instrument presented. Mathematical analysis of th rainbow theory included. *Subject Headings:* **Cloud meters, Water content of clouds, Drop siz distribution.**—*From author's summary.*

I–149 551.574.7:629.1

*Preston, G. Merritt and Blackman, Calvin C., **Effects of ice formations on airplane performanc in level cruising flight.** *U. S. N.A.C.A. Technical Note*, No. 1598, **1948.** 37 p. 15 figs., 3 table 7 refs. **DLC**—It is concluded from a flight investigation in natural icing conditions that ice forma tions on all of the components of the airplane except the propellers resulted in an increase in parasi drag of the airplane of 81 percent. *Subject Headings:* **Icing of aircraft, Aviation.**

I–150 551.574.7:551.508

Tribus, Myron, Young, G. B. W. and Boelter, L. M. K., **Analysis of heat transfer over a sma cylinder in icing conditions on Mount Washington.** *American Society of Mechanical Engineer Transactions*, 70:971–976, **1948.** 3 figs., table, 12 refs., 16 equations. **DLC**—Shown how a simp meter for measuring the liquid water content of a cloud through which an airplane is flying can b designed based upon the heat required to run the instrument "dry." *Subject Headings:* **Icing aircraft, Icing meters.**

I–151 551.574.7:551.50

Tribus, Myron, Young, G. B. W. and Boelter, L. M. K., **Limitations and mathematical basis f predicting aircraft icing characteristics from scale-model studies.** *American Society of Mechanic Engineers, Transactions*, 70:977–982, Nov. **1948.** 7 figs. (including 6 nomograms), 6 refs., 19 equ tions. **DLC**—Equations governing motions of a water droplet impinging on an aerodynamic sha are discussed in detail. The more complex the shape the more difficult the solutions. Solutions these differential equations however, can be obtained experimentally by the use of models, ar application of the principles of dimensional similarity. It is shown possible to expose a scale mod of an airplane to an icing condition, measuring the icing rates and the meteorological condition and then predict the icing characteristics of the prototype. *Subject Headings:* **Icing of aircraf Nomograms, Impingement.**

1949

I–152 551.574

Becker, Richard, **Eine einfache Methode zur klimatologischen Darstellung der Vereisung gefahr.** [A simple method for the climatological determination of the risk of icing.] *Meteor logische Rundschau*, 2(5–6):175–176, May–June **1949.** 9 figs. **DWB**—Areas of greatest risk icing Oct.–June are calculated from surface air isotherms, an assumed lapse of 0.6°C./100 m., ar frequency of rainfall. *Subject Heading:* **Icing of aircraft.**—*C.E.P.B.*

I–153 551.574.7

†Coles, Willard D., Rollin, Vern G. and Mulholland, Donald R., **Icing-protection requirements for reciprocating-engine induction systems.** *U. S. N.A.C.A. Technical Note*, No. 1993, **1949.** 61 p. 22 figs., 29 refs. **MH-BH**—Study made to combat all phases of icing of aircraft engine induction systems. Criteria for safe operation and for design of new induction systems established. Characteristics of the three forms of ice impact, throttling, and fuel evaporation studied. Effects on icing characteristics of several factors such as atmospheric conditions, engine and air-scoop configurations, type of fuel used, operating variables, mixture setting, etc. Ice detection methods investigated, as well as methods of preventing and removing induction system ice. *Subject Headings:* **Icing of aircraft, Icing prevention.**

I–154 551.574.42:551.558.1

Feniger, Klemens, **Étude de la transmission de froid par convection naturelle et de la formation de givre.** [Study of the transmission of cold by natural convection and the formation of rime.] *France, Centre National de la Recherche Scientifique, Journal des Recherches*, No. 8: 248–265, **1949.** 26 figs., 19 equations. **MH-BH**—Theoretical study in laboratory of transmission of cold by natural convection. *Subject Headings:* **Rime, Convection.**

I–155 551.574.7

Howell, Wallace E., **A comparison of icing conditions on Mount Washington with those encountered in flight.** Mt. Washington Observatory, [1949]. 31 p. 16 figs., 20 refs., equation. (Mimeographed.) U. S. N.A.C.A. Library, Washington, D. C.—Detailed comparison made considering conditions in the icing clouds; liquid water content, drop size, air temperature, orographic effect, turbulence, etc. Concluded that the form of ice and its density on small objects is representative of flight conditions, that mathematical compensations can be worked out, and that mountain stations offer particular advantages for particular investigations over in-flight experiments. *Subject Headings:* **Icing of aircraft, Mount Washington Observatory.**

I–156 551.574.7:551.508.765

†Howell, Wallace E., **A comparison of three multicylinder icing meters and a critique of the multicylinder method.** *Mount Washington Observatory Research Report*, Final Report July 15, **1949.** 30 p. 6 tables, 16 refs. (Typewritten manuscript.) Mount Washington Observatory Library—Three meters compared. Comparisons of drop size distribution were largely indeterminate. Critique of method given. Revisions in computations made, etc. *Subject Headings:* **Icing meters, Drop size distribution.**

I–157 551.576.1:551.574.1

†*Howell, Wallace, **The growth of cloud drops in uniformly cooled air.** *Journal of Meteorology*, 6:134–149, April **1949.** 16 figs., 5 tables, 3 refs., 7 equations. **DWB**—Manuscript copy, 145 p. 22 figs., 11 tables, 39 refs., equations. Mount Washington Observatory Library—A detailed and quantitative treatment of the physics of cloud drop formation. According to this study for the case of uniformly cooled air, "the numerical concentration of drops is determined primarily by the rate of cooling during the initial stage of condensation. It depends, as a rule, only slightly on the concentration of condensation nuclei. With continued uniform cooling, the drop concentration diminishes slightly toward a fixed constant value." Also shown that uniform lifting leads to a rather uniform drop size distribution. *Subject Headings:* **Condensation nuclei, Water content of clouds, Drop size distribution.**

I–158 551.574.7

Jones, Alun and Lewis William, **Recommended values of meteorological factors to be considered in the design of aircraft ice prevention equipment.** *U. S. N.A.C.A. Technical Note*, No. 1855, **1949.** 14 p. table, 11 refs. **MH-BH**—Four classifications are established for meteorological conditions conducive to aircraft icing, three of which are associated with cloud structure and the fourth with freezing rain. The range of possible meteorological factors for each classification are discussed, and specific values, recommended for consideration in design of ice prevention equipment for aircraft, are selected and tabulated. Recommendations for future research presented. *Subject Headings:* **Icing of aircraft, Icing prevention.**—*From author's abstract.*

I–159 551.508.7:551.574.7

Jones, Alun R. and Lewis, William, **A review of instruments developed for the measurement of the meteorological factors conducive to aircraft icing.** *U. S. N.A.C.A. Research Memorandum*, No. A9C09, April **1949.** 43 p. 11 figs., 15 refs. Mount Washington Observatory Library—Nine instruments reviewed and recommendations presented for further development. Meteorological

factors to be evaluated are listed, and tentative values for the desired and acceptable accuracy measurement for each factor are suggested. *Subject Heading:* **Icing meters.**

I–160 551.574.7:551.576(7

Kline, Dwight B., **Investigation of meteorological conditions associated with aircraft icing layer-type clouds for 1947–1948 winter.** *U. S. N.A.C.A. Technical Note*, No. 1793, Jan. 194 4 figs., table, 7 refs. **DLC**—Rotating cylinder measurements given of icing conditions encounter in flight in winter time stratus clouds in Midwest. Liquid water content, drop size, and temperatu data are shown to be consistent with previously measured conditions in supercooled layer type clouc Graphs show frequency of various icing conditions in Great Lakes area. *Subject Headings:* **Icing aircraft, Stratus clouds, Midwestern United States.**—*From author's abstract.*

I–161 551.574

*Lewis, William and Hoecker, Walter H., Jr., **Observations of icing conditions in flight duri 1948.** *U. S. N.A.C.A. Technical Note*, No. 1904, June **1949.** 43 p. 11 figs., 3 tables, 9 refs. **DL** —Meteorological data from 40 flights in icing conditions are presented. Discussion included of t relation between horizontal extent of icing conditions and average liquid-water content observ therein, the reliability of flight measurements of drop size distribution, and an apparent geographic influence upon the size of cloud drops. *Subject Headings:* **Icing of aircraft, Water content of cloud Drop size distribution.**—*From author's abstract.*

I–162 551.508.7:551.574

Meter measures icing rate. *Air Force*, 32(2):39, Feb. **1949. DLC**—Instrument developed General Mills and tested at Wright Field, determines quantity and rapidity of accumulation of i on surfaces. *Subject Heading:* **Icing meters.**

I–163 551.576:551.574.7:551.5

Mount Washington Observatory, **Contributions to the theory of the constitution of cloud** *Mount Washington Observatory Research Report*, Final Report, year ending Oct. 20, **1949. Part On** 43 p. **MH-BH**—General summary given of the theoretical study of the laws governing the physic constitution of clouds and the processes involved in the growth, maintenance, and decay of clo formations, and of the empirical study of the relation of certain physical characteristics of clouds primary and secondary features of general circulation. **II. A theory for the drop size distribution clouds,** by W. E. Howell, Raymond Wexler, and Seymour Braun, p. 6–18. 7 figs., tables, 6 refs., equations. Theoretical consideration developing an equation for growth of a cloud drop and givi models of cloud growth. **III. A study of the meteorological conditions conducive to icing on Mou Washington,** by Roland J. Boucher, p. 22–43. 12 figs., 5 tables, 6 refs.

Part Two. Observations of the constitution of clouds at Mount Washington. Comple records of daily cloud data on Mount Washington for the icing season Oct. 1948 to June 1949. Icir conditions at Mount Washington studied to suggest objective methods of forecasting the type ar intensity of icing in clouds. The existence of relationships between the occurrence of icing on M Washington, the liquid water content and drop size of clouds during icing conditions, and certa meteorological parameters, demonstrated.

Final Report, period ending June 30, 1950. (Continuation of same study.) To be publishe Aug. 1950.

Subject Headings: **Cloud physics, Ice formation, Observational data, Mount Washington Observator**

I–164 551.574.7:629.1

§Murray, James L., **Aircraft operation in natural icing conditions.** *U. S. Central Air Documen Office, Technical Data Digest*, 14(24):12–18, Dec. 15, **1949.** 6 figs., 6 refs. **DLC**—Article poin out some of things that can be done to make transports safe for all-weather operation. Data ar case studies of physical and meteorological conditions for icing are drawn mostly from N.A.C. reports by William Lewis, along with his general rules for predicting icing conditions. Ice preventic systems are briefly considered including use of Nesa glass in aircraft windshields. *Subject Heading* **Icing of aircraft, Icing prevention.**

I–165 551.574

Patterson, D. M., **A simplified procedure for the determination of heat requirements of ic protection of fixed areas of aircraft.** *U. S. Central Air Documents Office, Technical Data Diges* 14:15–23, Feb. 15, **1949.** 7 figs., equations. **DLC**—Procedure is set forth for the graphical solutic of thermal requirements which should permit the designer of subsonic aircraft to predict the pe formance of the thermal ice prevention system with a minimum of computational effort and withi a more reasonable length of time than previously possible. Thermal requirements are based c

meteorological conditions, and equations include meteorological factors. *Subject Headings:* **Icing of aircraft, Icing prevention.**—*From author's abstract.*

I–166 551.574.7

Ruggeri, Robert S., von Glahn, Uwe, and Rollin, Vern G., **Investigation of aerodynamic and icing characteristics of research fuel-vent configurations.** *U. S. N.A.C.A. Technical Note*, No. 1789, **1949.** 63 p. 20 figs., table. **DLC**—Research conducted at N.A.C.A. Cleveland icing research tunnel. The vents were investigated aerodynamically to obtain vent-tube pressures and pressure distributions on the ramp surface as functions of tunnel-air velocity and angle of attack. Icing investigations were made to determine the vent-tube pressure losses for several icing conditions at tunnel air velocities ranging from 220 to 440 feet per second. *Subject Headings:* **Icing of aircraft, Icing prevention.**

I–167 551.574.7

Tribus, Myron, **Intermittent heating for protection in aircraft icing.** (Thesis [Doctoral])—California University, Department of Engineering, September **1949.** 83 p. figs., diagr., illustr., 39 refs. (Unchecked)—*Subject Headings:* **Icing of aircraft, Icing prevention.**

I–168 551.5:629.13(02):551.574.7

§Viaut, André, **La météorologie du navigant.** [Meteorology of (aerial) navigation.] Paris, Éditions Blondel la Rougery, **1949.** 257 p. 139 figs., 25 plates, 3 fold. charts. **DLC**—Besides detailed discussion of all general phases of meteorology, the author takes up among other more specialized subjects, icing. Ten pages are devoted to a discussion of various sorts of aircraft icing, with a chart of the mean height of the zero isotherm over Europe, and many schematic (adiabatic and other) diagrams to indicate where the icing danger is most likely to be found. Abstract on other sections of this text, *see item* 3–9, *Meteorological Abstracts and Bibliography*, 1(3), March **1950.** *Subject Headings:* **Icing of aircraft, Aviation.**—*M.R.*

I–169 551.508.765

Vonnegut, Bernard, **A capillar collector for measuring the deposition of water drops on a surface moving through clouds.** *Review of Scientific Instruments*, 20:110–114, Feb. **1949.** 8 figs., ref., 2 equations. **DLC**—Instrument devised to measure the amount of water impinging on a small area moving through clouds, rain, or snow. From this sort of measurement the liquid water content of the atmosphere can be evaluated. *Subject Headings:* **Icing meters, Cloud meters, Water content of clouds.**

1950

I–170 551.574.7

Hacker, P. T. and Dorsch, R. G., **Ice protection for turbojet transport airplane. I. Meteorology and physics of icing.** [**II. Determination of heat requirements. III. Thermal anti-icing systems for high-speed aircraft.**] *Institute of the Aeronautical Sciences, Sherman M. Fairchield Publication Fund, Paper*, No. FF-1, presented March **1950.** Pt. I, p. 1–10, 10 figs., 2 tables, 3 refs. U. S. N.A.C.A. Library, Washington, D. C.—Meteorological and physical factors influencing icing are summarized. Values of the various icing parameters used by Lewis, Kleine, Steinmetz, and Hoecker, indicated. Values represent a compromise between the most frequent and the extreme values. Summarized in table. [Second two papers discuss design problems and performance of ice prevention systems for the jet transport.] *Subject Headings:* **Icing of aircraft, Icing prevention, Jets.**

I–171 551.574.7 551.574.42

Japan. Central Meteorological Observatory, [**Study of the physical aspects of ice formation.**] *Report*, 31, No. 3, March **1950,** 57 p. 140 figs., 9 tables, refs. Original in Japanese. **MH-BH**—Meteorological conditions for the formation of ice are treated: temperature, wind speed, humidity, cloud drop size and distribution, etc. The various types of ice are described and discussed from point of view of formation, growth, etc. A section is devoted to thermal aspects of icing, and another to microscopic examinations of the crystalline forms. *Subject Headings:* **Icing of aircraft, Ice formation, Rime.**

I–172 551.574.7

†Lewis, William, **Meteorological aspects of aircraft icing.** American Meteorological Society, **Compendium of Meteorology.** To be published. 4 tables, 3 equations, 19 refs.—Discussion of composition of clouds in general, and the type and severity of icing conditions to be expected in various weather situations. Physical characteristics and intensity of icing are considered dependent on the liquid water concentration, cloud drop diameter and temperature. Measurement of these factors is discussed with particular attention given to concentration of liquid water in clouds of

different formation, and to the size of cloud drops in the different cloud types. A section then tak up the problem of forecasting, emphasizing problems peculiar to forecasting icing intensity as separa from the general problem of weather forecasting. Brief discussions of the icing conditions likely be found in clouds of various types are given. Flight planning and dispatching are then consider in relation to icing conditions. Finally problems requiring further research are mentioned, such obtaining more satisfactory measurements of meteorological quantities involved, determination drop size distribution in clouds, need for improved instruments, knowledge of conditions und which ice crystals form in clouds, possibilities of cloud modification in icing problems. *Subj Heading:* **Icing of aircraft.**

I–173 551.574

†Mason, B. J., **The nature of ice-forming nuclei in the atmosphere.** *Royal Meteorological Socie Quarterly Journal*, 76:59–74, Jan. **1950.** fig., table, 33 refs., equations. **MH-BH**—Some revie and unification of theories and experiments of the last decade which have investigated the initi processes of ice formation in the atmosphere. A table shows eleven authors along with their r spective experimental methods and results as to properties exhibited by nuclei operative over te perature ranges. Investigation of nuclei have produced conclusions as to their identity as becomi operative between temperatures of 0° and −35° and −41°C. and just below −41°C. (*See ite* C–97, *Meteorological Abstracts*, March 1950.) *Subject Headings:* **Freezing nuclei, Ice formation.**

I–174 551.574

†Rodert, Lewis A., **Physical aspects of aircraft icing.** American Meteorological Society, *Co pendium of Meteorology*. To be published. 2 figs., 17 refs.—Thorough, comprehensive review problem from author's work which has been done and is to be done. An analysis is given of t physical phenomena of ice formations on vulnerable components of the airplane under vario atmospheric conditions. This analysis pertains to the atmospheric states and aerodynamic a thermodynamic phenomena in or near functioning airplane components during icing occurren commonly experienced. Analysis limited to subsonic flight conditions at altitudes below tropopaus Description included of effects ice has upon airplane components with limited quantitative eviden and references. Future research and development work needed is outlined, such as heat-trans relationships, variations in icing problems with altitude, critical geographic areas, physics of ici cloud stability, icing forecasting, instruments for collecting atmospheric data on icing. *Subj Heading:* **Icing of aircraft.**

I–175 551.574.7 551.508

Standard classification for types of aircraft icing. (In International Civil Aviation Organizatio Third session of the Meteorological Division, Paris, March 1950, Final Report, published Montreal, Canada, p. 136–143, May **1950.**)—Physical problems of aircraft icing reviewed, as well atmospheric conditions and icing forecasting. A standard classification of types of icing is propose and development of standard accurate icing meters and humidity, etc. measuring devices is recom mended. *Subject Headings:* **Icing of aircraft, Icing meters.**

BIBLIOGRAPHIES

I–176 551.574.7:01

†Burhoe, Ralph W. and Boardman, Horace P., [**List of papers on**] **icing in the atmospher** Supplement to "List of current publications on snow and ice," by same authors. *American Ge physical Union, Transactions*, p. 459–461, 1942. **DLC**—Titles arranged by year of date and with year by authors. Claimed to be quite complete for 1937–1939, but very incomplete for other year *Subject Headings:* **Icing of aircraft, Ice formation, Bibliographies.**

I–177 551.574.7:01

†Harrison, Louis, [**Card file on references to publications on the problem of icing.**] At U. Weather Bureau.—Includes about 300 references from 1921 to date, on all aspects of the icing pro lem: popular, scientific, research reports, airline reports on meteorological, physical and technologic aspects of riming, airplane vapor trails, icing prevention, etc., from American and a wide variety foreign sources. *Subject Headings:* **Icing of aircraft, Ice formation, Icing prevention, Rime, Bibl ographies.**

I–178 551.576:551.574.7:01

†Kramer, Harris P. and Rigby, Malcolm, **Selective annotated bibliography on cloud physics an "rain making."** *Meteorological Abstracts and Bibliography*, 1(3):174–190, March **1950.** 204 ref **DWB**—First section, "Physics of precipitation formation and condensation" contains many refe ences to material about ice formation in the atmosphere pertinent to icing of aircraft. Items a

arranged chronologically by year and alphabetically within years and are accompanied by brief annotations as to content. *Subject Headings:* **Cloud physics, Icing of aircraft, Ice formation, Bibliographies.**

I–179 551.574.7:016

†U. S. N.A.C.A., **Index of N.A.C.A. technical publications, 1915–1947.** Washington, D. C., **1947. Icing,** p. 333–334. 41 refs. **DLC, DWB**—*Subject Headings:* **Icing of aircraft, Icing prevention, Bibliographies.**

I–180 551.574.7:016

†U. S. Library of Congress, Aeronautics Division, [**Card file on**] **ice formation. DLC**—Some more general and meteorological references are included, although most of the references are to more particular and technical aspects, such as icing of various parts of aircraft and icing prevention techniques. *Subject Headings:* **Icing of aircraft, Icing prevention, Bibliographies.**

I–181 551.574.7

†U. S. Works Progress Administration, **Ice formation.** (Part III, in its **Bibliography of Aeronautics, Part 21.** Compiled from the Index of Aeronautics of the Institute of the Aeronautical Sciences, New York, **1937,** p. 34–43.) **DLC**—Items are arranged chronologically from 1937 to 1921. They refer to all phases of the icing problem including the meteorological, although most are concerned with the technical problems and de-icing techniques. *Subject Headings:* **Icing of aircraft, Icing prevention, Bibliographies.**

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodicals, included in this section, are for information only, and will not be listed in either the author or subject indexes. When material is furnished in advance of date of publication, the pagination may be omitted.

American Meteorological Society, Bulletin, Volume 31, Number 7, September 1950.

Charney, Jule G.: **Progress in dynamic meteorology,** p. 231–236.
Palmén, E.: **Progress in synoptic meteorology,** p. 237.
McClendon, Elmo W.: **The role of meteorology in projects of the Corps of Engineers in t Missouri River Basin,** p. 238–243.
Riehl, Herbert: **Further studies of the movement of formation of hurricanes and their forecastin** p. 233–253.
Benton, George S. and Blackburn, Robert T.: **A comparison of precipitation from maritime a continental air,** p. 254–256.
Simon, Albert: **Methods of stratus and fog forecasting for Payne Field (Farouk Airport) a vicinity, Egypt,** p. 257–263.
Hewson, E. Wendell: **Recommendations of the Meteorology Panel, United States Technic Conference on Air Pollution,** p. 264–265.

Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B, Volume 2, Number 1– June 1950.

Albrecht, F.: **Die Methoden zur Bestimmung der Verdunstung der natürlichen Erdoberfläch** [Methods for determining the evaporation on the natural soil], p. 1–38.
Steinhauser, F.: **Über die Windverstärkung an Gebirgszügen,** [On the reinforcement of wi on mountain ranges], p. 39–64.
Wierzejewski, H.: **Theoretisches und Konstruktives zur Messung der Abkühlungsgröss** [Some theoretical and constructive considerations for measurement of cooling power p. 65–85.
Henneberger, Charlotte: **Tagesgang und Komponenten der Abkühlungsgrösse,** [Daily vari tions and the components of cooling power], p. 86–119.
Steinhäusser, H.: **Über die Bewertung der Schneeverhältnisse alpiner Orte auf Grund d Abhängigkeit der Andauer der Schneedecke, der mittleren maximalen Schneehöhe u ihrer Eintrittszeit von der Seehöhe,** [On the evaluation of snow conditions in Alpine arc based on the dependence of duration of the snow cover, mean maximum of snow depth a the time of appearance upon height above sea level], p. 120–121.
Steinhäusser, H.: **Zur Bestimmung des Schneeanteils am Gesamtniederschlag,** [The determin tion of amount of snow in the total amount of precipitation], p. 129–133.
Bornschein, H.: **Untersuchungen über die Hauttemperatur bei Sauerstoffmangel,** [Investig tions of skin temperature during oxygen deficiency], p. 134–139.

Arctic, Journal of the Arctic Institute of North America, Volume 1, Number 1, 1948.

Reichelderfer, F. W.: **Meteorological services in Alaska,** p. 19–26.
Bibliography and roster project, p. 26.
Petersen, Helge: **The Danish meteorological service in Greenland,** p. 27–33.
Thomson, Andrew: **The growth of meteorological knowledge of the Canadian Arctic,** p. 34–4

Arctic, Volume 1, Number 2, 1948.

Tremaine, Marie: **Bibliography of arctic research,** p. 84–87.
Nutt, David C.: **Second (1948) U. S. Navy Antarctic Development Project,** p. 88–92.
Shelesnyak, M. C.: **The history of the Arctic Research Laboratory, Point Barrow, Alaska,** 97–106.
Wood, Walter A.: **Project "Snow Cornice,"** p. 107–112.

Arctic, Volume 2, Number 1, May 1949.

Jenness, John L.: **Permafrost in Canada,** p. 13–27.
Hachey, H. B.: **Canadian interest in Arctic oceanography,** p. 28–35.

Arctic, Volume 2, Number 2, September 1949.

Hare, F. Kenneth and Montgomery, Margaret R.: **Ice, open water, and winter climate in the eastern Arctic of North America:** Part I, p. 79–89.
Court, Arnold: **Shipwrecked German weathermen winter in ice caves on Shannon Island, northeast Greenland,** p. 108–117.
Schell, Irving I.: **A study of the east Greenland and associated ice.** Review of **The east Greenland ice,** by Lauge Koch, p. 120–122.

Arctic, Volume 2, Number 3, Dec. 1949.

Victor, Paul E.: **The French expedition to Greenland, 1948,** p. 135–148.
Hare, F. Kenneth and Montgomery, Margaret R.: **Ice, open water, and winter climate in the eastern Arctic of North America: Part II,** p. 149–164.
Maclure, K. C.: **Polar navigation,** p. 183–194.
Koch, Lauge: **Two summer expeditions to northeast Greenland.** Review of **The coast of northeast Greenland, with hydrographic studies in the Greenland Sea,** by Louise A. Boyd, p. 195–196.

Arctic, Volume 3, Number 1, April 1950.

Hare, F. Kenneth: **The upper air over northern Canada.** Review of **Aerological data for northern Canada,** by T. J. G. Henry and G. R. Armstrong, p. 66–67.

La Météorologie, Ser. 4, Number 17, January–March, 1950.

Sanson, J.: **La sécheresse remarquable de la période 1941–1949 en France,** [The remarkable drought of 1941–1949 in France], p. 1–18.
Blot, C.: **La prévision météorologique de l'état de la mer,** [Meteorological forecasts of the state of the sea], p. 19–28.
Lejay, R. P.: **La mesure à Shanghai de la quantité totale de vapeur d'eau contenue dans l'atmosphère,** [Measurements of the total amount of water vapor contained in the atmosphere at Shanghai], p. 29–38.
Notes and Correspondence
Dallant, M.: **Un effet de foehn remarquable à Menton, le 7 avril 1949,** [A remarkable föhn effect at Menton on April 7, 1949], p. 39–45.
Analyses et bibliographie, [Abstracts and bibliography], p. 46–51.
Procès-verbaux des Réunions de la S.M.F., [Transactions of meetings of the Société Météorologique de la France], p. 52–74.

Polarforschung, 1944.

No meteorological articles.

Polarforschung, Jahrgang 15, Nr. 1–2, 1945.

Groissmayr, Fritz Béla: **Weltwetter und Klimaschwankung im Nordpolargebiet,** [World weather and climate oscillation in the North Polar area], p. 5–9.
Groissmayr, Fritz Béla: **Die grosse Klimaschwankung seit 1935 im subpolaren Raum,** [The big climate oscillation since 1935 in the subpolar area], p. 15–16.
Ruthe, Kurt: **Zur Erwärmung der Arktis,** [Warming up of the Arctic], p. 20–22.

Polarforschung, Jahrgang 16, Nr. 1–2, 1946.

Groissmayr, Fritz Béla: **Temperaturschwankungen im Januar in Zentral Alaska,** [Temperature oscillations in January in Central Alaska], p. 83.
Groissmayr, Fritz Béla: **Die Bedeutung der Januartemperatur am Unterlaufe der Lena,** [Importance of the January temperature on the lower course of the Lena], p. 84.
Groissmayr, Fritz Béla: **Die Bedeutung des Temperaturanstieges im Erstfrühling auf den Färöern für die Langfristprognose,** [Importance of the increase of temperature in early spring on the Faroes for the long range forecast], p. 88.
Schindler, Gerhard: **Die Lichtverhältnisse der Polargebiete,** [The light conditions of Polar areas], p. 89–93.

Groissmayr, Fritz Béla: **Eine 2,72-jährige Periode der Januartemperatur in Dawson,** [T
2.72-years period of the January temperature at Dawson], p. 102.
Koch, H. G.: **Der strenge Winter 1946/47 in Mitteleuropa und dem nördlichen Polargebi**
[The severe winter of 1946/47 in middle Europe and the North Polar area], p. 111–118.

Polarforschung, Jahrgang 17, Nr. 1–2, Aug. 1947.

Groissmayr, Fritz Béla: **Der Verlauf der geglätteten Wintertemperatur auf Island,** [The var
tions of the smoothed winter temperature on Iceland], p. 142.
Flohn, Hermann: **Grundzüge der atmosphärischen Zirkulation über Sibirien und dem a**
grenzenden Polarmeer, [The fundamental features of atmospheric circulation over Sibe
and the adjoining Polar Sea], p. 143–149.
Groissmayr, Fritz Béla: **Die gewaltige Temperaturkompensation im Dezember: Baren**
seeregion und Weisses Meer mit Turkestan, [Large temperature compensation
December; Barents Sea region and White Sea with Turkestan], p. 149.
Dege, Wilhelm: **Das Nordostland von Spitzbergen. II Teil. Klima und Wetter.—Das Mee**
und Buchteis, [Northeast land of Spitsbergen. Part II. Climate and weather. Sea a
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Groissmayr, Fritz Béla: **Die Einflussnahme der Wintertemperatur in Ost-Island auf jene d**
darauffolgenden Sommers, [Influence of the winter temperature in eastern Iceland on t
following summer], p. 163–164.
Ruth, Kurt: **Von den wissenschaftlichen Ergebnissen der Forschungsstation "Nordpol**
[Scientific results of the research station "North Pole"], p. 170–171.
Groissmayr, Fritz Béla: **Die Milderung der Wintertemperaturen auf Island seit der Jah**
hundertwende, [The tempering of the winter temperatures on Iceland since the turn
the century], p. 176.
Groissmayr, Fritz Béla: **Die ungewöhnliche Wärme von Dezember 1946 und Januar 1947**
Island, der Höchstwert seit 100 Jahren, [Unusual warmth of December 1946 and Janua
1947 in Iceland; the extreme high value for 100 years], p. 179.

Polarforschung, Jahrgang 18, Nr. 1–2, Jan. 1948.

Person, Hermann: **Entwicklung und Einsatz von unbemannten automatischen Wetterfun**
stationen im Polargebiet, [Development and installation of unmanned automatic weathe
radiostations in the Polar area], p. 6–9.
Sandner, Werner: **Die Halo-Beobachtungen der Deutschen Grönland-Expedition Alfr**
Wegener 1930–31, [Halo observations made by the German Greenland expedition
Alfred Wegener 1930–31], p. 20–24.
Dannmeyer, F.: **Zur Frage der Gegensätzlichkeit der kalten Winter in Grönland zu den warm**
Wintern in Deutschland, [Concerning the contrast between cold winters in Greenland a
warm winters in Germany], p. 29–30.
Belkin, A. Leo: **Die wirkliche Kältepollage im Norden,** [The actual location of the cold pole
the north], p. 44.

Revista Meteorologica, Volume 9, Number 33, April 1950.

Escobar, Ismael: **Anteproyecto de una Oficina Meteorológica en el Instituto Internacional de**
Hylea Amazónica, [Tentative proposal for a Meteorological Service for the Internation
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Tiscornia, José: **La aplicación del método de los equivalentes de Azzi y su comparación con**
cálculo estadístico de las correlaciones en los problemas de Ecología Agrícola, [The a
plication of Azzi's equivalent method and its comparison with statistical correlations in t
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Serra, Adalberto: **Monografía sobre mecanismo del "Tempo" en el Brasil,** [Monograph on t
mechanism of the "weather" in Brazil], p. 71–84.

PART IV. AUTHOR AND SUBJECT INDEX

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